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# Preface

## Welcome!

Step into the wonderful world of forensic science with *The Cookie Jar Mystery*, a thrilling twelve-lesson course tailor-made for fourth and fifth-grade students. Unlock the secrets of crime scene investigation and ignite your student's scientific curiosity while embarking on a journey to solve the crime that has occured in Mrs. Randall's classroom!

*The Cookie Jar Mystery* gives your students the opportunity to delve into the riveting world of forensic science, where biology, chemistry, physics, and cutting-edge technology converge. This educational adventure is an opportunity to explore the practical applications of science within the confines of your classroom. Elevate your students' learning experience by embracing the multifaceted world of forensic science—the perfect addition to any science curriculum. Our lessons and activities are meticulously crafted to fulfill the Next Generation Science Standards (NGSS). This course also satisfies the Common Core State Standards in Mathematics, English Language Arts, and Literacy, offering a holistic educational foundation for your students. For an in-depth exploration of these standards, refer to the comprehensive Standards Matrix in the appendix.

Community Learning courses are a dynamic force, igniting the imagination of young minds and nurturing youthful curiosity across the country for countless years. Thematic integration coupled with prolonged, hands-on engagement is the cornerstone of every Community Learning experience.

## Who and Where Can You Teach *The Cookie Jar Mystery*?

Our easy-to-manage materials and step-by-step guides support all instructors. No specialized knowledge is required to teach the course, making this entertaining forensic science mystery ideal for classrooms, after-school programs, intersession programs, museum groups, summer camps, youth groups, and clubs—anywhere young people are gathered!

> *"The Cookie Jar Mystery had my students fully engaged in a hands-on learning experience. Each session my students came with more questions and an eagerness to dig into the exercises to piece together the puzzle."*
>
> - Robert K., Middle School Science Teacher, University of Wisconsin Continuing Education

## Hands-on Enrichment and Critical Thinking in Science

Across the nation, there's a resounding call for hands-on activities that cultivate vital skills for students like critical thinking, confidence, competence, and scientific literacy. Educators and leaders recognize the influential role of high-quality after-school programs, especially those with a sharp focus on science, mathematics, and literacy. *The Cookie Jar Mystery* isn't just a course; it's an exhilarating mystery that unlocks the doors to these essential skills and more—allowing your students to immerse themselves in scenarios designed to inspire creative problem-solving, foster critical thinking, nurture teamwork, and get their hands dirty collecting evidence. *The Cookie Jar Mystery* is a gateway to a world of discovery and empowerment!

> *"Children don't stop learning when the last bell rings. That's why ongoing, quality after-school programs are so important, and why school leaders need to consider how in-school and after-school learning are connected."*
>
> - Vincent Ferrandino, Executive Director of the National Association of Elementary School Principals

## Initiate Exploration

Immerse your students in an exciting, hands-on learning experience with *The Cookie Jar Mystery*. The course is centered around a crime that unfolds in Mrs. Randall's classroom as her favorite cookie jar was broken and some of her homemade cookies were

eaten. Even though breaking a cookie jar and stealing a few cookies isn't a major crime, we can still use forensicscience to solve them. Mrs. Randall turns this misfortune into opportunity and calls in a "Chief Crime Scene Investigator" (*your course instructor*) to teach her "forensics team" (*your students*) how to use the tools of forensic science in analyzing clues left at the crime scene.

Each student member of this team is a "Crime Scene Investigator" tasked with solving the mystery through scientific observation, sample examination, analysis, lab work, testing, interviews, and field work. To draw the students into the mystery, the instructor will set the stage by recounting Mrs. Randall's intriguing tale. Beforehand, the instructor will create names for the four student suspects—names that students will find believable and relatable. These names replace "Suspects 1 – 4" used throughout the course materials. The suspects are three girls and one boy, and two of the girls are sisters. Having the instructor choose the names allows the course to be taught again and again, as this approach prevents incoming students from discovering prematurely who committed the crime.

> *"This amazing program has enabled my students to comprehend the process of forensic science as well as the sophisticated vocabulary encompassed in the program's lessons."*
>
> - Erika T., Teacher, Freehold Public Schools, Freehold, NJ

## From Crime Scene to Classroom: Teaching the Cookie Jar Mystery

Instructors, get ready to dive into *The Cookie Jar Mystery*—a teaching experience that's accessible and packed with excitement! We've got all your teaching needs neatly packed in our lightweight carryalls, making the setup a breeze. Each lesson teaches a different forensic technique, encouraging scientific reasoning and immersing your students in exciting scientific processes.

Once you've explored the lesson, vocabulary, and the desired outcomes, it's time to transform your classroom into a hub of group exploration. Our lessons provide clear instructions on how to set up each demonstration, utilizing the provided materials in our course kit.

Safety is our top priority, so we've got you covered with specific precautions tailored to each lesson. The instructor should be sure to know where emergency assistance and supplies are located.

Every student activity in these lessons is a piece of the puzzle and could be the key to solving the mystery. The instructor should review the corresponding pages in the Student Book in order to successfully guide your students through each lesson. As the instructor, your enthusiasm is essential for keeping your students invested in the mystery!

## Course Kit Components

Each Course Kit comes with a printed Instructor's Guide and Teacher Resources on a thumb drive (referred through this guide simply as "Resources"). The thumb drive contains a PDF version of the Instructor's Guide, Student Book, Handouts, Supply Lists, Safety Sheets, and Video Links. Our course kits also contain all the materials you need to successfully guide your students through each lesson.

## The Cookie Jar Mystery: Teacher Resources and QR Code

Our online resources provide instructors with an in-depth guide to *The Cookie Jar Mystery*, ensuring that the instructor and the students can make the most out of this one-of-a-kind crime scene investigation. This resource page includes an introduction to the course, the Preparation Overview, Lesson by Lesson Training, Video Tutorials, and access to the Instructor's Guide, the Student Book, and the Student Handouts. To access these helpful resources, scan the QR code below or visit **https://blog.commlearning.com/** to get started!

## Instructor's Guide

Our Instructor's Guide is easy to follow and provides clear instructions in each lesson. The Instructor's Guide features a list of lesson objectives, materials needed for each lesson, and directions on how to prep for each lesson. The Instructor's Guide also contains the following:

**Notes for the Instructor**

Brief instructor notes that introduce the subject matters and challenges presented in each lesson. They often contain real-life, age-appropriate examples from historical and contemporary crimes. This section may be shared with your students to help them gain a deeper understanding of forensic investigation.

**Notes for the Students**

A brief overview of the activities, objectives, and vocabulary covered in the upcoming lesson, is meant to get your students excited about forensic science!


**Vocabulary**

New and relevant terms are defined here. Also, note the comprehensive "Glossary" at the end of the Instructor's Guide and Student Books.

**Lab Directions**

Step-by-step procedures are provided for both the instructor's demonstration and the student activity.

**Wrap-up**

Discussion-provoking questions are designed to summarize learning and help students take their inquiry further. These questions are also provided at the end of each lesson in the Student Books, where students will document their answers and observations related to each lesson.

**Other Directions, Discussions, and Destinations**

To extend lessons and deepen understanding across disciplinary and cultural divides, relevant links to multimedia, web resources, and books are provided here.

## Student Books

Designed for students to record their discoveries class after class, the Student Books will keep your young Forensic Investigators engaged in their scientific investigation throughout the course. The books serve as companions to the Instructor's Guide and contain reports, charts, visual aids, and areas to record observations, as well as a full glossary of terms used in the course. The complete *The Cookie Jar Mystery* Student Book is provided in Resources for your individual use.

## Companion Resources

After purchasing *The Cookie Jar Mystery*, instructors will have access to a number of companion resources, including lesson extensions and other ideas for dynamic classroom activities. Links to forensic videos and other multimedia resources provide exciting lesson extensions. Immediate support is always available by phone, email, or webinar from our experts at Community Learning.

## About Community Learning

At Community Learning, we believe learning should be a journey fueled by curiosity, so we create and curate hands-on learning kits and partner with organizations that share our vision for exploration-based education. Instead of traditional textbooks, our activities and resources get learners doing, thinking, and exploring—whether they're aspiring scientists, storytellers, or makers—while building critical thinking skills through engaging challenges and real-world problem-solving. Working alongside outstanding educators and experts, we carefully select and develop kits and products that inspire through engagement and fun, helping parents and educators nurture their learners' natural curiosity in ways that spark discoveries that could last a lifetime. Together, let's engage, expand, and inspire the next generation of lifelong learners.

If you have any questions, suggestions, or feedback, please visit our website or email us at **info@commlearning.com**.

# Preparation Overview

| | Lesson 1<br>**Heads Up: Observation Skills** | Lesson 2<br>**Think Ink: Ink Chromatography** | Lesson 3<br>**The White Stuff: White Substances and Toxicology** | Lesson 4<br>**Pull Some Strings: Fiber Analysis** |
|---|---|---|---|---|
| **Print/Copy** | Student Book pages iii-9 | Student Book pages 10-12 | Student Book pages 13-14 | Student Book pages 15-17 |
| **Organize Kit Supplies** | • Sets of practice pictures<br>• Cookie Jar Mystery crime scene photos<br>• Pencils | • Suspect pens<br>• Isopropyl alcohol<br>• Plastic cups<br>• Foam plates<br>• Plastic straws<br>• Chromatography paper<br>• Pencils<br>• Scissors<br>• Paper clips<br>• Rolls of tape | • Iodine and dropper<br>• Vinegar<br>• Permanent marker<br>• Dropper bottles<br>• 2 Water Bottles<br>• Set of white powders<br>• Black paper squares<br>• Foam plates<br>• Hand lenses<br>• Portion cups<br>• Wooden splints<br>• Pencils | • Black fiber samples<br>• Tweezers<br>• Fiber samples card-stock<br>• Wide tape<br>• Hand lenses<br>• Pencils |
| **Prepare** | • Read Instructor's Guide Preface and Introduction<br>• Select and name your suspects | • Make crime scene chromatography strips for each group | • Fill and label dropper bottles with water and vinegar<br>• Set up chemical distribution center | • Unravel fabric samples<br>• Tear pieces of tape |
| **Acquire Additional Supplies** | | • Paper Towels | • Water | |

## Preparation Overview

| | Lesson 5<br>**Hair We Go: Hair Samples** | Lesson 6<br>**Follow the Grain: Pollen Analysis** | Lesson 7<br>**Make an Impression: Bite Marks** | Lesson 8<br>**Bloody Brilliant: Blood Types** |
|---|---|---|---|---|
| **Print/Copy** | Student Book pages 18-20 | Student Book pages 21-22 | Student Book pages 23-25 | Student Book pages 26-28 |
| **Organize Kit Supplies** | • Hair samples<br>• Hand lenses<br>• Tweezers<br>• Scissors<br>• Hair samples cardstock<br>• Rolls of tape<br>• Pencils | • Pollen samples<br>• Hand lenses<br>• Toothpicks<br>• Pollen samples cardstock<br>• Rolls of tape<br>• Pencils<br>• Scissors | • Foam cups<br>• Hand lenses<br>• Plastic bag for cut slides<br>• Scissors<br>• Pencils<br>• Rulers<br>• Permanent markers | • Simulated blood and anti-sera<br>• Blood exam trays<br>• Permanent markers<br>• Pencils<br>• Toothpicks<br>• Disposable gloves<br>• Blood typing guides |
| **Prepare** | • Set up activity demonstration<br>• Print Hair Slide Transparencies from master in Resources. | • Print Pollen Slide Transparencies from master in Resources<br>• Cut transparency sheets into columns<br>• Set up activity demonstration | • Print Cookie Transparencies from master in Resources.<br>• Cut cookie transparences into slides | • Set up activity demonstration |
| **Acquire Additional Supplies** | • 30 blank transparenices | • 10 blank transparenices | • Paper Towels<br>• 10 blank transparenices | • Lined Paper<br>• Paper Towels |

## Preparation Overview

| | Lesson 9<br>One of a Kind: Fingerprint Evidence | Lesson 10<br>Crack the Code: DNA | Lesson 11<br>Let's Talk: Questioning the Suspects | Lesson 12<br>Who Dunnit?: Piecing Together the Evidence |
|---|---|---|---|---|
| **Print/Copy** | Student Book pages 29-32 | Student Book pages 33-36 | Student Book pages 37-43 | Student Book pages 51-53<br>Certificates of Completion |
| **Organize Kit Supplies** | • Ink strips<br>• Ink towelettes<br>• Ten cards<br>• Hand lenses<br>• Pencils | • 2 Water Bottles<br>• Dish soap<br>• Salt<br>• Isopropyl alcohol<br>• Measuring spoons<br>• 250 mL containers<br>• Plastic spoons<br>• Resealable plastic bags<br>• Coffee filters<br>• Plastic cups<br>• Wooden splints<br>• Pencils<br>• Foam plates | • Pencils | • Pencils |
| **Prepare** | • Set up activity demonstration | • Remove any strawberry leaves and stems<br>• Put isopropyl alcohol into the freezer<br>• Put water into the refrigerator | • Organize groups of students | • Print and fill out Certificates of Completion |
| **Acquire Additional Supplies** | | • Fresh or Frozen Strawberries<br>• Water | | |

Lesson 1

# HEADS UP!

Lesson 1

# Heads Up: Observation Skills

## Objectives

**Students will:**

- Practice observational skills by trying to notice and recall details in a photograph
- Learn about the job of a document examiner and the techniques used in handwriting analysis
- Practice observational skills of comparing and contrasting characteristics of handwriting

## Materials

**Instructor:**

- 10 sets of "practice pictures" (2 pictures per set)
- 3 Cookie Jar Mystery crime scene photos

**Students (per group of three):**

- Student Book pages (see Resources)
- 3 pencils

## Preparation

- This activity will introduce the four suspects to the mystery. If you have not already, it is important to give each suspect a name (see Introduction page). Keep in mind that suspect names can be changed each time you teach the course. This can be helpful in keeping the ending a secret in each session.
- Read the Introduction (found on page ix) to students before beginning this lesson.

## Notes for the Instructor

*The Cookie Jar Mystery* is a project-based learning experience that asks your students to complete a series of activities in order to figure out who ate Mrs. Randall's cookies. Students will learn about specialized jobs, techniques and tools employed by forensic scientists. The more realistic the mystery seems to your students, the more engaged and invested they will be in learning the information and conducting the science experiments. As the instructor, your enthusiasm and investment is key!

This introductory lesson is focused on observation skills. In the first activity students will be challenged to see how many details they can notice and recall. You will guide students through observations, discussions, and an analysis of two different photographs. Then, students will be introduced to *The Cookie Jar Mystery* with a photo taken from the crime scene. Students will utilize their powers of observation to begin to unravel the mystery. Taking in details at the scene and being able to recall them later is a key skill for investigators. Students will realize that these skills can be strengthened with practice and by implementing helpful strategies.

In the second activity, students will use their powers of observation to compare and contrast the note left behind at the cookie jar crime scene and handwriting samples taken from the four suspects. Notes or other written documents that are part of the evidence at a crime scene, usually with an unknown or unverified author, are called **questioned documents**. Handwriting experts called **document examiners** are called in to compare the questioned document to handwriting samples taken from the suspects.

Handwriting samples can be collected in two ways. The first way is called **request writing**, and is obtained from a suspect during the investigation and with a witness present. The second type of sample is called **non-request writing**. These are samples that were written previously, before the person became a suspect in the investigation. If the authorship can be verified, a non-request writing sample is preferred. This is because request-writing samples can vary from a person's true writing, possibly because the person is nervous about being questioned, or perhaps because he is deliberately trying to change his handwriting.

In forensics, experts study the unique characteristics and nuances of an individual's handwriting, including its **form**, **line quality**, **arrangement**, and **content**. They also look at the type of pen and paper used. Often the work of a document examiner is to notice differences rather than similarities. This is especially the case if a document is suspected of being forged, or written by someone other than the

assigned author. While it is possible to copy someone else's writing, it is almost impossible to erase all traces of our own individual writing style.

Some characteristics of writing are visible to the **naked eye**, meaning they are visible without the use of any additional tools. However, forensic scientists often use hand lenses, microscopes, and special lighting to analyze handwriting as well. These tools can highlight inconsistencies in the paper or ink of a note. Angled lights can show indents on the paper that might suggest a signature was traced. Backlighting reveals eraser marks and use of correction fluid. The observations made by your students today will be with the naked eye.

The activities in this lesson address Next Generation Science Standards practices of Planning and Carrying Out Investigations and Analyzing and Interpreting Data. In addition, they address Common Core Learning Standards. See the appendix on page 105 for more details.

## Notes for the Students

Welcome to the investigative team! Throughout the investigation you will be presented with a lot of **forensic evidence** that may help you to figure out what happened in the Cookie Jar Mystery! Remember, forensic evidence is anything that can be used to prove that a person did or did not have something to do with a crime.

There will be many tools that we will need throughout this investigation, however the tools you need first are already right in front of you, literally! The number one tool or skill for any investigator is the ability to make **observations**. Observations are any bits of information that you gather about the environment using one or more of your five senses: sight, smell, hearing, touch, taste.

As a lead investigator it is important your observational skills are top notch. That means using all of your senses and slowing down so that you don't miss any details. It also means being able to spot similarities and differences between objects. In order to make sure you are up for the task of solving the crime, we are going to spend a bit of time today working on our observational skills.

We will test our observational skills in two different ways. First, we will practice looking at various scenes, including the cookie jar crime scene. The goal will be to slow down and take in as many details of the scene as possible. The challenge will be trying to recall these details with accuracy afterwards.

Second, we will look closely at the note left behind by the person who took the cookies. Notes or other documents that are part of a crime scene investigation are called **questioned documents**. Often investigators need to find out who the author of the note is, or verify that the assigned author is actually the person who wrote the note. This can be done by observing the small similarities and differences in how people write. Suspects in a case will be asked to provide a writing sample that can be compared to the questioned document. People who study notes or documents associated with crimes are called **document examiners**.

A person's handwriting is very specific to him. The way someone holds a pen, how he shapes letters, the amount of space he leaves between words and lines, as well as the amount of pressure applied while writing are all features of handwriting that can be used to analyze a document. They can reveal clues, including the identity of the author. Today you will learn about many characteristics that help document examiners distinguish handwriting.

Sometimes handwriting analysis can help solve a case! In 1922, a few scraps of paper helped capture the Yule Bomb Killer. On December 27th, Clementine Chapman opened a package that she thought was a late Christmas gift. It exploded. The packaging was pieced back together, and from just a few words recovered from the address label, the police were able to trace the bomber. The misspelling of words pointed to someone who did not speak English well. When police looked for suspects in the small community, there was only one person who had been feuding with Chapman over land boundaries. This gave the person a motive for the crime and made him a suspect. A handwriting sample, as well as ink and bomb-making materials, were found in the suspect's home. They led to the arrest of John

Magnuson. Investigators were correct. Magnuson was born in Sweden and did not speak English well.

Today we will use these same techniques of handwriting analysis to try to match the four cookie jar suspects' handwriting with the note found in Mrs. Randall's classroom.

## Vocabulary

**Arrangement**: in handwriting, how the letters and words are placed on the page, including spacing and alignment

**Content**: in handwriting, the spelling, phrasing, punctuation, and grammar of the written document

**Document examiners**: professionals who analyze notes or documents associated with a crime

**Forensic evidence**: any physical thing that may be used in a criminal court to convict or clear a person

**Form**: in handwriting, the shape of letters and their slant

**Line Quality**: in handwriting, the thickness of the line caused by the type of writing tool and the pressure used while writing

**Naked eye:** looking at something without assistance of any device like a hand lens or microscope

**Non-request handwriting**: an example of a person's handwriting that was written before the investigation began

**Observation**: information gathered about the environment using one or more of the five senses (sight, smell, taste, touch, hearing)

**Questioned document**: notes or written articles related to a crime scene where the author is unknown

**Request handwriting**: an example of a person's handwriting provided as part of an investigation with a witness present

**Suspect**: one who authorities think may have committed a crime

## Activity 1: Practice Pictures

*15 Minutes*

1. Divide students into groups of three. Ask students to position themselves so that when photos are turned over for viewing, all group members can see clearly.

2. Ask one student to turn over photo #1 for 20 seconds. All students should examine the photo carefully. After the period of study is complete, ask students to turn photo #1 face down and answer questions on *Activity 1: Practice Pictures* found in their activity books on page 2. Allow time for students to answer questions before you move on to the next photo. Repeat for photo #2.

3. Ask students to compare their answers for photo #1 to the actual photo. Allow some time for discussion of responses. How did student answers differ to questions #1? Why do you think people saw different things? Did anyone answer questions #2, 3 and 4 correctly? What techniques did they use to remember these details? What details led to your answer to question #5?

4. Repeat the process for photo #2. Again, allow time for students to discuss their answers and how they lined up with the picture. Were students better able to recall details in photo #2 than in photo #1? Why might this be?

5. Display or pass around *The Cookie Jar Mystery* crime scene photo so everyone can see it. Ask the students to observe the photo for clues. After a few minutes, take the photo back and ask students what they saw that may be pertinent to solving the mystery.

6. Refer to the crime scene photo during future lessons as needed.

## Activity 2: Comparison of Handwriting Samples

*30 Minutes*

1. Read out loud *Activity 2: Comparison of Handwriting Samples* found in the Student Book while students are following along with examples of each handwriting characteristic on the activity sheet *Handwriting Exemplars* on pages 5-6.

2. Direct students to *Activity 2: Suspect Handwriting Samples* on page 7. Have them complete the *Handwriting Analysis Summary* chart on page 8 for each suspect.

3. Have students study the note left behind at the crime scene. Complete the last column of the chart based on this sample.

4. Using the results from the chart, ask students to compare the handwriting characteristics of the four suspects with the note left behind at the crime scene.

5. Have students work in pairs to discuss their charts. Did both people have the same answers? Why might answers be different? Have students share which suspect's handwriting they think best matches the note left at the crime scene. Do students agree? Encourage students to use their charts and point out examples to defend their idea.

6. If time permits, have students analyze one another's handwriting by completing the *Wrap-up Activity: Student Handwriting Samples* on page 9.

## Wrap-Up

*10 minutes*

1. Discuss the results from today's lesson. Why is observation important to forensic scientists?

2. In what ways can observation be helpful?

3. What are some ways to improve your powers of observation and memory recall?

## Clean-up

*5 Minutes*

1. Make sure the room is back in order.

2. Collect and store all materials.

## Other Directions, Discussions and Destinations

1. To make *The Cookie Jar Mystery* more fun and exciting, you can mock up a "crime scene" in your room. Locate a cookie jar, cookies, and catsup or red dye. Carefully break the cookie jar on the floor so that it looks like it was knocked over. Drip a small amount of artificial blood on a piece of the jar. Now for the fun part: partially eat a few cookies and drop them around the broken cookie jar to look like a thief did it. If you want to make it even more realistic, you can add some hair and black fabric threads taken from the materials in the upcoming lessons. Let the class look at the recreated "crime scene" for a few minutes and then see what they can recall later.

2. Developing our powers of observation often starts with improving our memories. Here's an old parlor game that's still played today:

**Memory Story**

Gather together 15 or 20 items from around the house, the classroom, or the supply box. A pencil, key, comb, spoon or cup could be among these. The 15 items should be random. Put these items together on a tray and cover them. Then gather in small groups around the tray. Remove the cover for 30 seconds and ask each member in the group to try to commit to memory all of the items. After 30 seconds, cover the items, and ask each person to write down as many items as they can remember.

➔ Some won't remember every item, and some will. Ask the people with the best memories how they remembered the items - often you'll discover that they've constructed a "memory story" to help them remember what they've seen.

➔ For example, Karen told the following story: "I just put it together like this when I saw the items: I thought to myself, I need a key (key) to open the door to the kitchen, where I would go to the drawer and get a spoon (spoon) to stir my coffee (cup); as I drink my coffee, I often make a list of the things I need to do (pencil) which include combing my hair (comb), etc."

3. And try these observational skills tests on the Internet:

- Here's some fun: can you find nine people in this picture? **https://www.orderofthewhitelion.com/observation-powers/**

4. Do your students think they can forge a note? Have every student in the class write a simple note using a pencil, such as "Please excuse Johnny from school today. He has the flu!" and sign it. With students in groups of five, have them pass the notes to the person on their right and try to copy one another's handwriting and signature. Do this until each person in the group has had a turn. Mix up the notes – can they find their own original handwriting?

5. Not everyone thinks handwriting analysis is a legitimate science. Read more about it at **https://www.straightdope.com/columns/read/2447/is-handwriting-analysis-legit-science/**

6. The most infamous forger of the early 20th century was Joseph Cosey. He specialized in copying the handwriting and signatures of many historical figures, including US presidents. See his work at: **https://www.forbes.com/sites/booked/2011/02/13/historical-autographs-forgery-lincoln-franklin-washington/**

NOTES

Lesson 1

# Activity 1: Practice Pictures

## Picture #1

Look at the first picture for 20 seconds and then answer the following questions:

**1.** What did you see in the picture?_____

_____

_____

_____

**2.** How many cars are in the picture? _____

**3.** How many trucks are in the picture? _____

**4.** How many people are in the picture? _____

**5.** Was anyone in danger? _____

_____

_____

_____

_____

Lesson 1

# Activity 1: Practice Pictures

## Picture #2

Look at the second picture for 20 seconds and then answer the following questions:

**1.** What is happening in this picture? _____

_____

_____

**2.** Where is it taking place? _____

**3.** How many vehicles are in the picture? _____

**4.** What was the person wearing? _____

_____

## Enlarged photo of Cookie Jar Crime Scene

**1.** List as many details as you can recall from the photograph of the scene. _____

_____

_____

**2.** Circle the details that you think may be important to remember in this case.

**3.** Compare your list to a partner's list. What details did you each recall? Which ones did each of you miss? Are there any details you both missed? _____

_____

_____

Lesson 1

# Activity 2: Comparison of Handwriting Samples

There are 12 characteristics that document examiners use to study handwriting. Read below to learn more about them. We will be using some of them, but not all, during our investigation of the *Cookie Jar Mystery.*

1. **Line quality**: Do the letters flow neatly or is the handwriting shaky?

2. **Spacing**: Are letters equally spaced or crowded? Are the margins even?

3. **Size consistency**: Is the height and/or width of the letters consistent?

4. **Continuous**: Is writing continuous, or does the writer lift the pen or pencil between letters of a word?

5. **Connecting letters**: Are capitals and lower-case letters connected?

6. **Lettering complete**: Does the letter begin and end on the page?

7. **Unusual letter formations**: Is there a mix of printed and cursive letters?

8. **Pen pressure**: Is pressure (how hard one presses with the writing tool) equal when applied to upward and downward strokes? Is the pressure light, medium, or heavy?

9. **Slant**: Do the letters lean to the left, right or both?

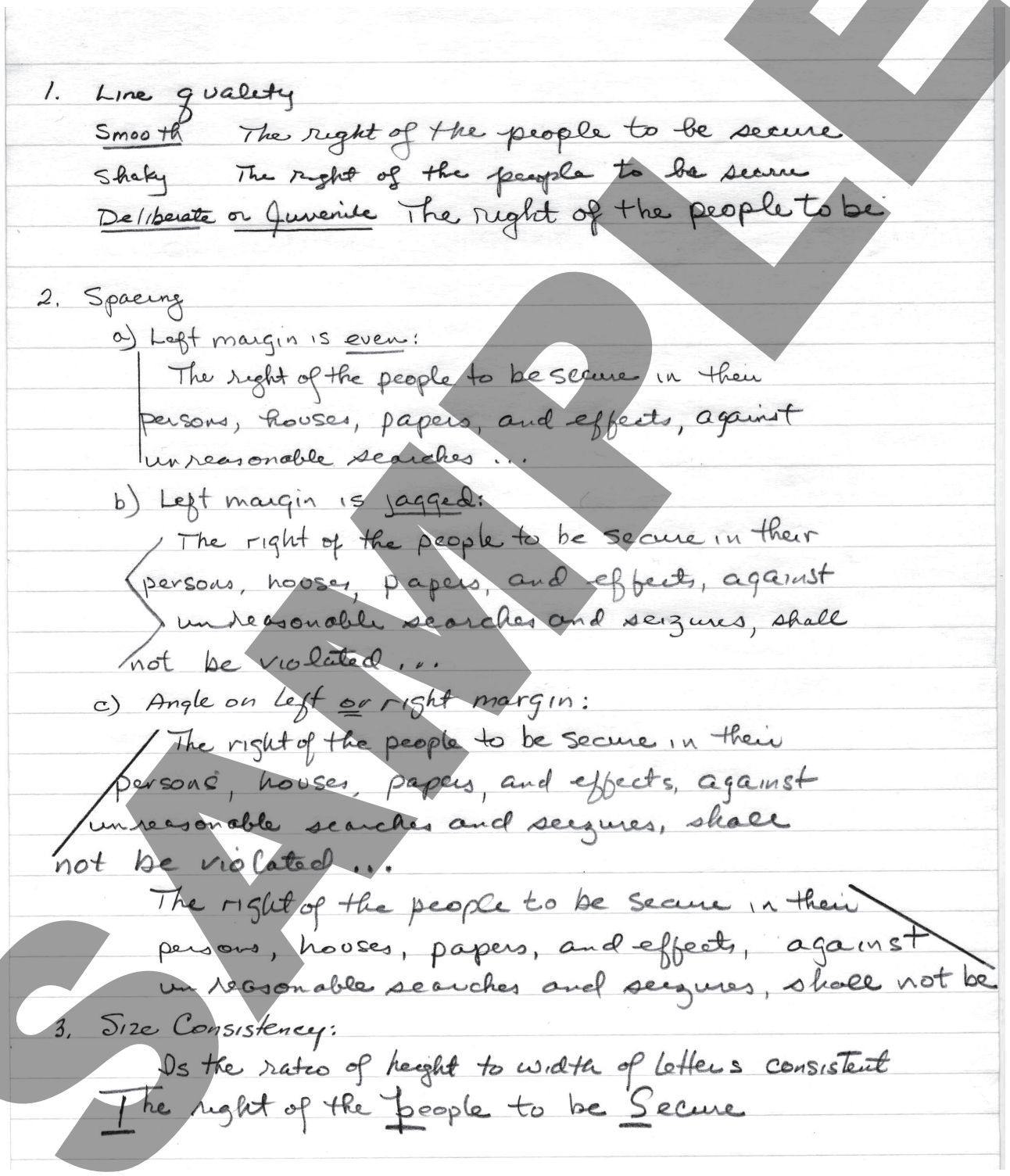
10. **Baseline habits**: Is the text on the line, above the line, or below the line?

11. **Fancy curls or loops**: Have either of these been used?

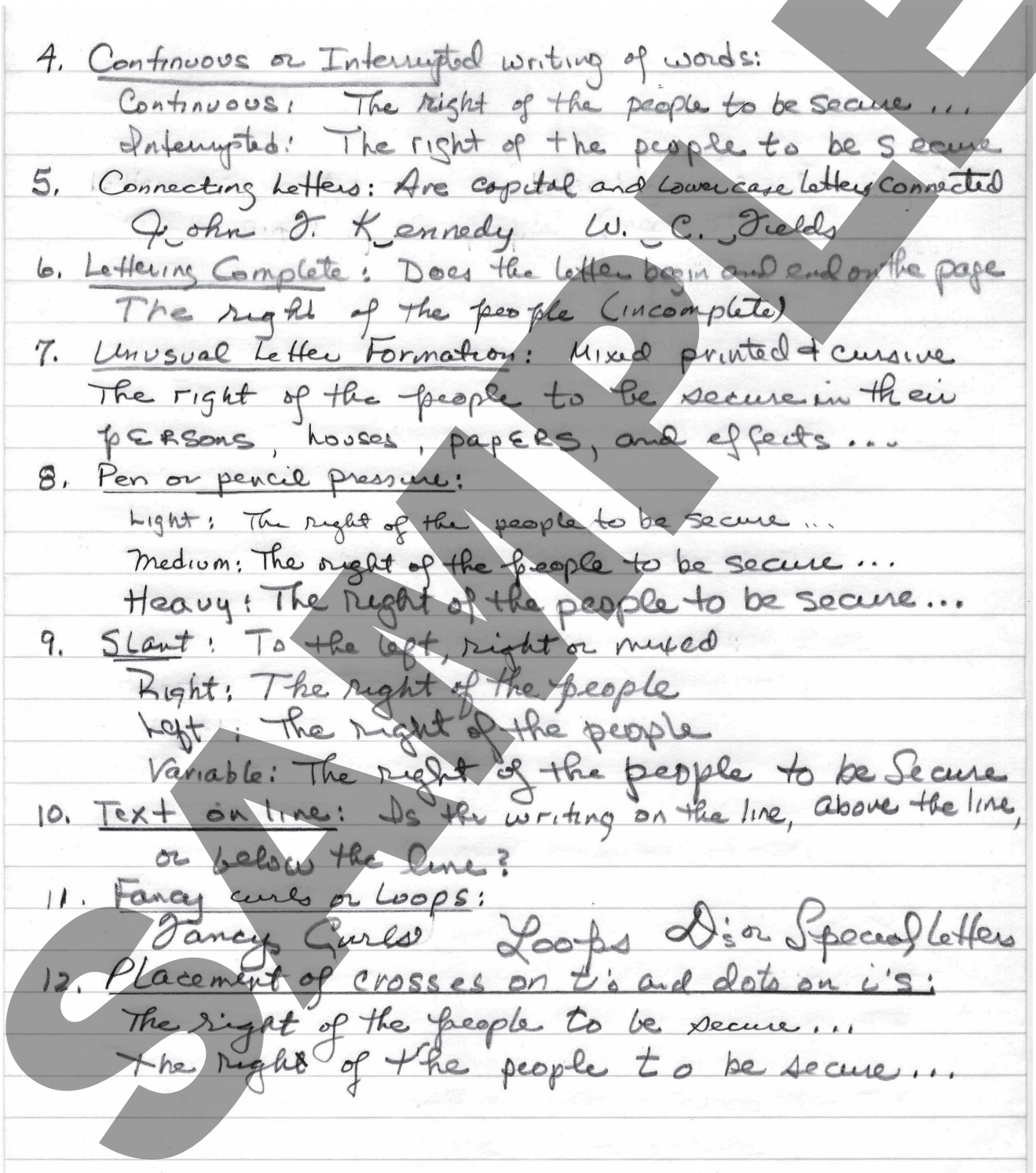
12. **Placement of crosses on "t's" and dots on "i's"**: Have these crosses and dots been properly placed?

See *Handwriting Exemplars* on the next page.

# Activity 2: Handwriting Exemplars



# Activity 2: Handwriting Exemplars



4. Continuous or Interrupted writing of words:
   Continuous: The right of the people to be secure ...
   Interrupted: The right of the people to be S ecure
5. Connecting Letters: Are capital and lowercase letters connected
   John F. Kennedy W. C. Fields
6. Lettering Complete: Does the letter begin and end on the page
   The right of the people (incomplete)
7. Unusual Letter Formation: Mixed printed & cursive
   The right of the people to be secure in their
   persons, houses, papers, and effects ...
8. Pen or pencil pressure:
   Light: The right of the people to be secure ...
   Medium: The right of the people to be secure ...
   Heavy: The right of the people to be secure ...
9. Slant: To the left, right or mixed
   Right: The right of the people
   Left: The right of the people
   Variable: The right of the people to be Secure
10. Text on line: Is the writing on the line, above the line, or below the line?
11. Fancy curls or Loops:
    Fancy Curls Loops D's or Special letters
12. Placement of crosses on t's and dots on i's:
    The right of the people to be secure ...
    The right of the people to be secure ...

# Activity 2: Suspect Handwriting Samples

**EXHIBIT B**

| | |
|---|---|
| Suspect #1 | Im Sorry about the jar<br>The cookies were delicious |
| Suspect #2 | I'm sorry about the jar.<br>The cookies were delicious. |
| Suspect #3 | I'm sorry about the jar<br>the cookies more delicious |
| Suspect #4 | I'm Sorry abut the jar<br>the cookies were delicious |

Lesson 1

# Activity 2: Handwriting Analysis Summary

**EXHIBIT B**

Determine whether or not the following characteristics are present for each sample of handwriting provided.

| Characteristic | Sample #1 | Sample #2 | Sample #3 | Sample #4 | Crime Scene Note |
|---|---|---|---|---|---|
| Are letters neat or shaky? | neat | neat | neat | neat | neat |
| Is left margin even? | no | yes | no | yes | yes |
| Are capital and lower-case letters connected? | yes | yes | yes | yes | yes |
| Are letters of each word continuous? | yes | yes | yes | no | no |
| Is there a mix of printed letters and cursive letters? | no | no | no | yes | yes |
| Do all letters slant to the right? | no | yes | no | no | no |
| Is writing on the line? | yes | no | yes | yes | yes |
| Do letters have fancy curls or loops? | no | no | no | yes | yes |
| Is the crossing of "t's" and dotting of "i's" correct? | yes | no | yes | yes | yes |

**1.** Which writing sample shows the most similarities to the questioned document (the note found at the crime scene)? #4

**2.** Are there any other samples that are somewhat similar? Yes

Copy of the Crime Scene Note

I'm sorry about your
the cookies were delicious

Lesson 1

# Wrap-up Activity: Student Handwriting Samples

**1.** Examine your own handwriting by copying the following sentence: "Have members of your group copy this sentence and then trade papers with a partner to analyze each other's handwriting."

**2.** Exchange activity books with your partner.

**3.** On the chart below, determine which characteristics are present.

Answer the following:

| | |
|---|---|
| Are letters neat or shaky? | |
| Is the left margin even? | |
| Are capital and lower-case letters connected? | |
| Are letters of each word continuous? | |
| Is there a mix of printed and cursive letters? | |
| Do all letters slant to the right? | |
| Is the writing on the line? | |
| Do letters have fancy curls or loops? | |
| Is the crossing of "t's" and dotting of "i's" correct? | |

Lesson 1

# Heads Up

observation skills

## Background

Welcome to the investigative team! Throughout the investigation you will be presented with a lot of **forensic evidence** that may help you to figure out what happened in the Cookie Jar Mystery! Remember, forensic evidence is anything that can be used to prove that a person did or did not have something to do with a crime.

There will be many tools that we will need throughout this investigation, however the tools you need first are already right in front of you, literally! The number one tool or skill for any investigator is the ability to make **observations**. Observations are any bits of information that you gather about the environment using one or more of your five senses: sight, smell, hearing, touch, taste.

As a lead investigator it is important your observational skills are top notch. That means using all of your senses and slowing down so that you don't miss any details. It also means being able to spot similarities and differences between objects. In order to make sure you are up for the task of solving the crime, we are going to spend a bit of time today working on our observational skills.

We will test our observational skills in two different ways. First, we will practice looking at various scenes, including the cookie jar crime scene. The goal will be to slow down and take in as many details of the scene as possible. The challenge will be trying to recall these details with accuracy afterwards.

Second, we will look closely at the note left behind by the person who took the cookies. Notes or other documents that are part of a crime scene investigation are called **questioned documents**. Often investigators need to find out who the author of the note is, or verify that the assigned author is actually the person who wrote the note. This can be done by observing the small similarities and differences in how people write. Suspects in a case will be asked to provide a writing sample that can be compared to the questioned document. People who study notes or documents associated with crimes are called **document examiners**.

A person's handwriting is very specific to him. The way someone holds a pen, how he shapes letters, the amount of space he leaves between words and lines, as well as the amount of pressure applied while writing are all features of handwriting that can be used to analyze a document. They can reveal clues, including the identity of the author. Today you will learn about many characteristics that help document examiners distinguish handwriting.

Sometimes handwriting analysis can help solve a case! In 1922, a few scraps of paper helped capture the Yule Bomb Killer. On December 27th, Clementine Chapman opened a package that she thought was a late Christmas gift. It exploded. The packaging was pieced back together, and from just a few words recovered from the address label, the police were able to trace the bomber. The misspelling of words pointed to someone who did not speak English well. When police looked for suspects in the small community, there was only one person who had been feuding with Chapman over land boundaries. This gave the person a motive for the crime and made him a suspect. A handwriting sample, as well as ink and bomb-making materials, were found in the suspect's home. They led to the arrest of John Magnuson. Investigators were correct. Magnuson was born in Sweden and did not speak English well.

Today we will use these same techniques of handwriting analysis to try to match the four cookie jar suspects' handwriting with the note found in Mrs. Randall's classroom.

My Notes:

# Activity 1: Practice Pictures

## Picture #1

Look at the first picture for 20 seconds and then answer the following questions:

**1.** What did you see in the picture?_____

_____

_____

_____

**2.** How many cars are in the picture? _____

**3.** How many trucks are in the picture? _____

**4.** How many people are in the picture? _____

**5.** Was anyone in danger? _____

_____

_____

_____

_____

# Activity 1: Practice Pictures

## Picture #2

Look at the second picture for 20 seconds and then answer the following questions:

**1.** What is happening in this picture? _____

_____

_____

**2.** Where is it taking place? _____

**3.** How many vehicles are in the picture? _____

**4.** What was the person wearing? _____

_____

## Enlarged photo of Cookie Jar Crime Scene

**1.** List as many details as you can recall from the photograph of the scene. _____

_____

_____

**2.** Circle the details that you think may be important to remember in this case.

**3.** Compare your list to a partner's list. What details did you each recall? Which ones did each of you miss? Are there any details you both missed? _____

_____

_____

# Activity 2: Comparison of Handwriting Samples

There are 12 characteristics that document examiners use to study handwriting. Read below to learn more about them. We will be using some of them, but not all, during our investigation of the *Cookie Jar Mystery*.

1. **Line quality**: Do the letters flow neatly or is the handwriting shaky?

2. **Spacing**: Are letters equally spaced or crowded? Are the margins even?

3. **Size consistency**: Is the height and/or width of the letters consistent?

4. **Continuous**: Is writing continuous, or does the writer lift the pen or pencil between letters of a word?

5. **Connecting letters**: Are capitals and lower-case letters connected?

6. **Lettering complete**: Does the letter begin and end on the page?

7. **Unusual letter formations**: Is there a mix of printed and cursive letters?

8. **Pen pressure**: Is pressure (how hard one presses with the writing tool) equal when applied to upward and downward strokes? Is the pressure light, medium, or heavy?

9. **Slant**: Do the letters lean to the left, right or both?

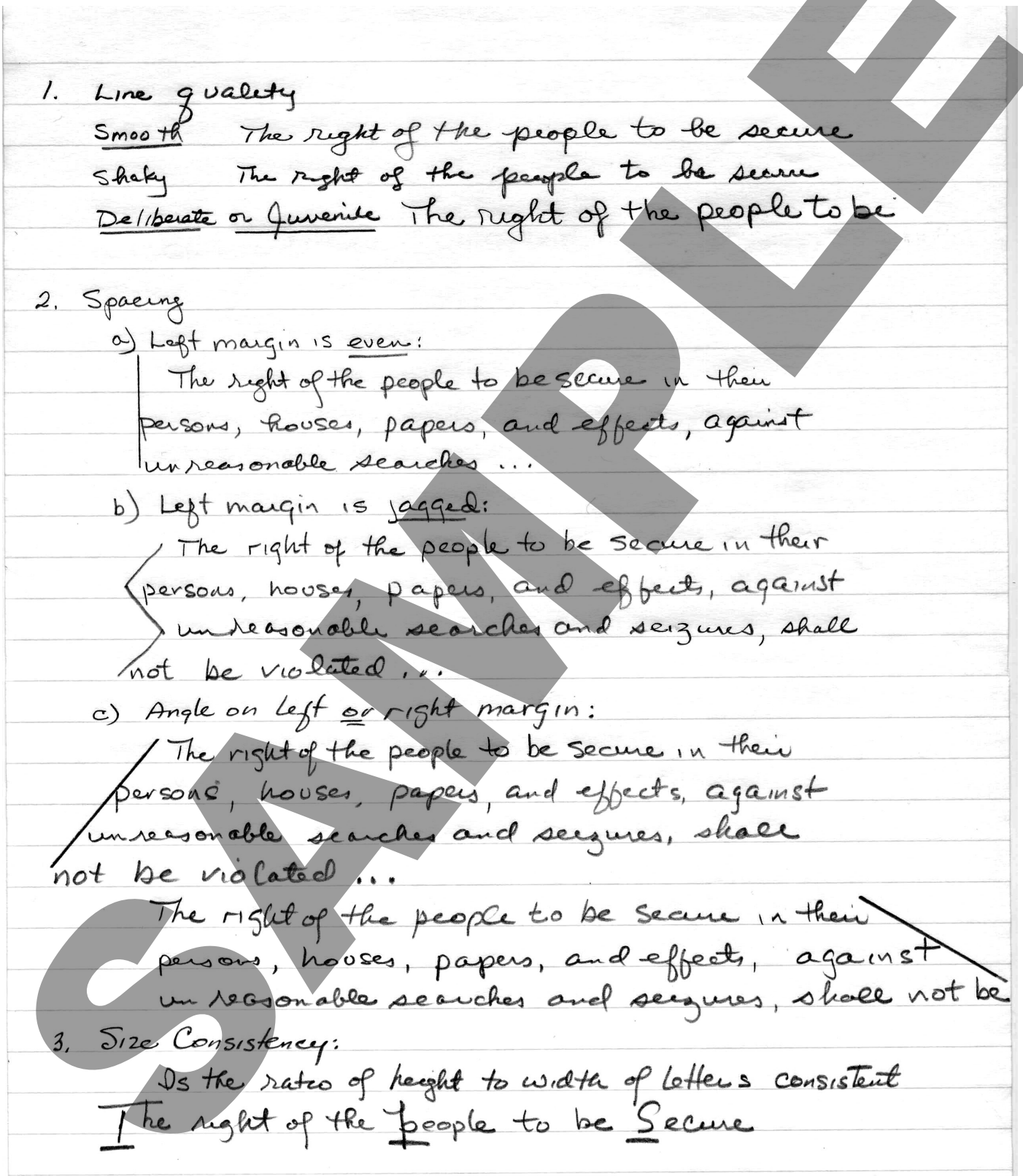
10. **Baseline habits**: Is the text on the line, above the line, or below the line?

11. **Fancy curls or loops**: Have either of these been used?

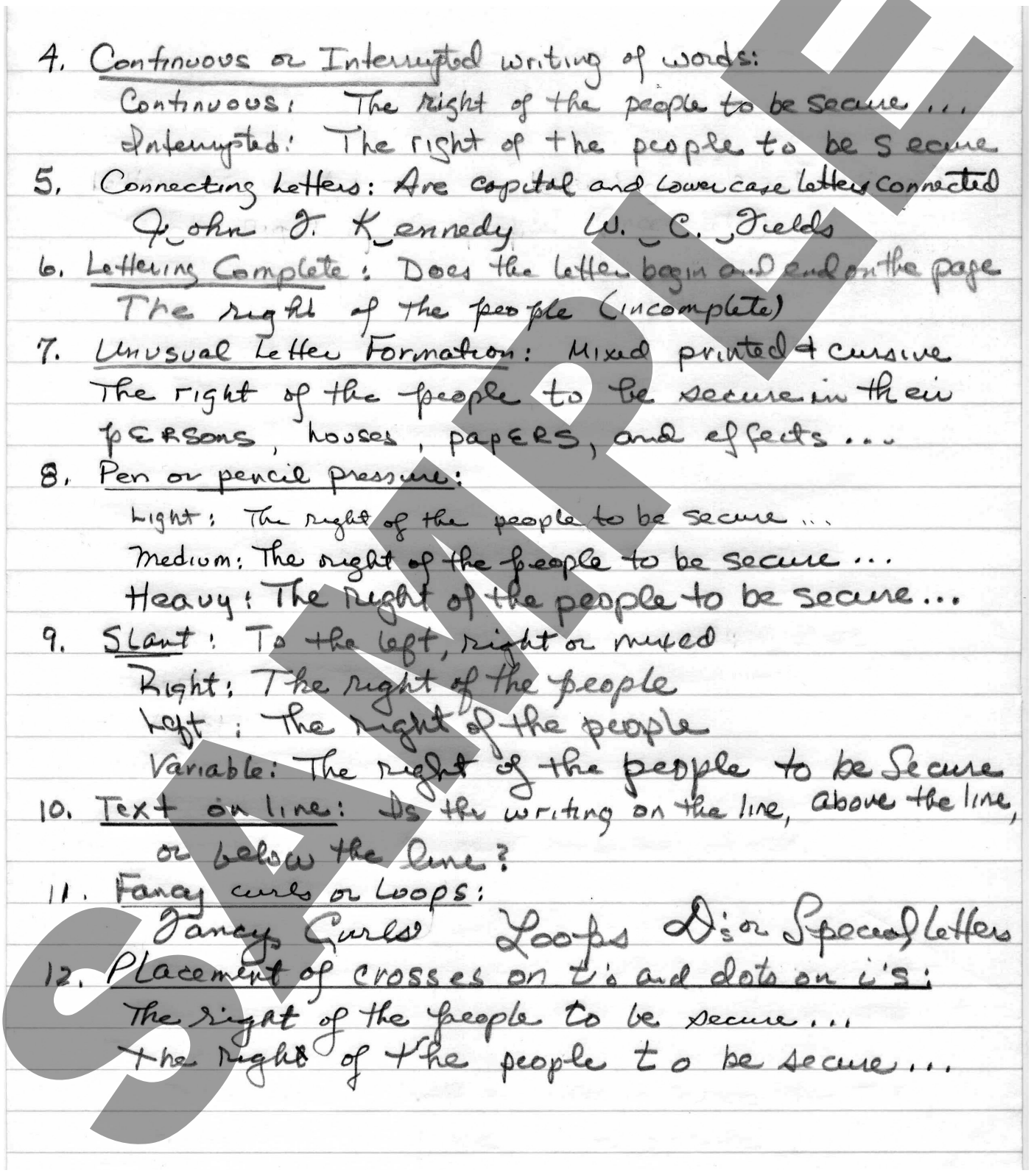
12. **Placement of crosses on "t's" and dots on "i's"**: Have these crosses and dots been properly placed?

See *Handwriting Exemplars* on the next page.

# Activity 2: Handwriting Exemplars



# Activity 2: Handwriting Exemplars


4. Continuous or Interrupted writing of words:
Continuous: The right of the people to be secure ...
Interrupted: The right of the people to be S ecure
5. Connecting Letters: Are capital and lowercase letters connected
John F. Kennedy W. C. Fields
6. Lettering Complete: Does the letter begin and end on the page
The right of the people (incomplete)
7. Unusual Letter Formation: Mixed printed + cursive
The right of the people to be secure in their
persons, houses, papers, and effects ...
8. Pen or pencil pressure:
Light: The right of the people to be secure ...
Medium: The right of the people to be secure ...
Heavy: The right of the people to be secure ...
9. Slant: To the left, right or mixed
Right: The right of the people
Left: The right of the people
Variable: The right of the people to be Secure
10. Text on line: Is the writing on the line, above the line, or below the line?
11. Fancy curls or Loops:
Fancy Curls Loops D's or Special letters
12. Placement of crosses on t's and dots on i's:
The right of the people to be secure ...
The right of the people to be secure ...

# Activity 2: Suspect Handwriting Samples

**EXHIBIT B**

| | |
|---|---|
| Suspect #1 | Im Sorry about the jar<br>The cookies were delicious |
| Suspect #2 | I'm sorry about the jar.<br>The cookies were delicious. |
| Suspect #3 | I'm sorry about the jar<br>the cookies were delicious |
| Suspect #4 | I'm Dany abut the jar<br>the cookies were delicias |

# Activity 2: Handwriting Analysis Summary

**EXHIBIT B**

Determine whether or not the following characteristics are present for each sample of handwriting provided.

| Characteristic | Sample #1 | Sample #2 | Sample #3 | Sample #4 | Crime Scene Note |
|---|---|---|---|---|---|
| Are letters neat or shaky? | | | | | |
| Is left margin even? | | | | | |
| Are capital and lower-case letters connected? | | | | | |
| Are letters of each word continuous? | | | | | |
| Is there a mix of printed letters and cursive letters? | | | | | |
| Do all letters slant to the right? | | | | | |
| Is writing on the line? | | | | | |
| Do letters have fancy curls or loops? | | | | | |
| Is the crossing of "t's" and dotting of "i's" correct? | | | | | |

**1.** Which writing sample shows the most similarities to the questioned document (the note found at the crime scene)? _____

**2.** Are there any other samples that are somewhat similar? _____

Copy of the Crime Scene Note

I'm sorry about yar
the cookies were delicious

# Wrap-up Activity: Student Handwriting Samples

**1.** Examine your own handwriting by copying the following sentence: "Have members of your group copy this sentence and then trade papers with a partner to analyze each other's handwriting."

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| Is there a mix of printed and cursive letters? | |
| Do all letters slant to the right? | |
| Is the writing on the line? | |
| Do letters have fancy curls or loops? | |
| Is the crossing of "t's" and dotting of "i's" correct? | |

# Glossary

**Agglutination:** the clumping of blood cells due to the introduction of an anti-serum

**Arch pattern:** the ridges of the fingerprint that enter from one side, make a rise in the center and exit on the opposite side of the print, having the appearance of a capital letter "A"

**Arrangement:** in handwriting, how the letters and words are placed on the page, including spacing and alignment

**Blood:** the liquid flowing through the circulatory system, bringing oxygen to the body

**Blood type:** the type of blood found in people determined by the A-B-O system which looks at A, B and O proteins, as well as Rh proteins in blood

**Body Language:** how a suspect holds herself during an interview

**Canines:** the teeth located on either side of the incisors; they look like "fangs" on both the top and bottom of your jaw

**Chemical indicator:** a chemical that changes color showing the presence of some unknown material

**Chromatogram:** the pattern of separated components of a chemical

**Chromatography:** the process of separating a chemical into its components

**Circumstantial:** evidence that connects a person to the crime scene, but does not necessarily point to his direct involvement with the crime

**Class evidence:** evidence that will not positively convict a suspect but will provide additional information that might be presented at trial

**Comparison microscope:** a microscope that allows side-by-side comparisons of two slides

**Contact:** the physical touching of two persons or a person with an object. If contact is made, trace evidence can be exchanged

**Content:** in handwriting, the spelling, phrasing, punctuation, and grammar of the written document

**Cross-transfer:** the shared exchange of something (hair, fibers, blood, etc.) between two people or objects that have come in contact with one another

**Crystal:** a natural formation of a chemical. This could be a small cube like an individual piece of sugar or salt

**Dactyloscopy:** the study of using fingerprints to identify someone

**Deduce:** to figure something out logically by weighing the facts involved

**Dissolve:** when two substances mix together to form one solution

**DNA:** material found in all living things that acts as a body's biological instruction manual to develop, survive and reproduce

**DNA testing:** the process of using skin, hair, blood or other bodily fluids to identify patterns in a person's genetic code and compare them to patterns found at a crime scene

**Document examiners:** professionals who analyze notes or documents associated with a crime

**Enzymes:** special proteins that can cut DNA into sections at particular spots

**Fiber:** a thread-like piece of material that is the smallest unit of a woven fabric

**Fingerprint:** the impressions of lines and patterns made by a person's fingertip

**Forensic evidence:** any physical thing that may be used in a criminal court to convict or clear a person

**Forensic odontology:** the handling, examination and evaluation of dental evidence

**Forensic palynology:** the science of analyzing pollen and spores to help solve criminal cases

**Forensic serologist:** a scientist who studies bodily fluids, including blood, found at crime scenes

**Form:** in handwriting, the shape of letters and their slant

**Genetic code:** the sequence of nucleotides in DNA

**Incisors:** the front, flat-edged teeth on the top and bottom of your jaw

**Interview:** a question and answer session between two people, used to obtain information

**Laboratory:** a place where evidence can be sent for analysis by crime scene investigators

**Line quality:** in handwriting, the thickness of the line caused by the type of writing tool and the pressure used while writing

**Locard's Exchange Principle:** whenever two objects (or persons) come in contact, trace evidence will be exchanged between them

**Loop pattern:** ridges of the fingerprint that enter from the left or the right, re-curve and pass out the same side they entered, appearing somewhat like a rounded knob

**Man-made fibers:** fibers made from materials other than plant or animal products, such as a combination of chemicals. Examples include nylon, polyester and satin

**Means:** the resources to do something. Ex. A suspect has a boat, therefore he has the means to access the island where the crime occurred

**Medium:** in chromatography, the material through which the chemical and its solvent travel

**Molars:** teeth located behind the premolars. They are wide and flat for grinding food and are located on the top and bottom of your jaw

**Motive:** the inner drive, or reason, that causes a suspect to commit a crime. Ex. A man who feels angry that his neighbor is always raking leaves on to his property has a motive to cut down all his neighbor's trees in the middle of the night

**Naked eye:** looking at something without assistance of any device like a hand lens or microscope

**Natural fibers:** fibers created from plant or animal products. Examples include cotton, linen, silk and wool

**Non-request handwriting:** an example of a person's handwriting that was written before the investigation began

**Nucleotide:** a building block of DNA

**Observation:** information gathered about the environment using one or more of the five senses (sight, smell, taste, touch, hearing)

**Opportunity:** a combination of circumstances that are favorable for a purpose. Ex. freshly baked brownies were left on the counter when the boy came home from school and there was no one around to tell him not to eat them, so he did

**Pollen:** the powdery material produced by a seedbearing plant

**Pollen print:** a specific mix of microscopic pollen grains and spores from plants in a particular geographic region

**Poison:** a substance that can injure or kill a living thing

**Premolars:** teeth located behind the canines. They are wide and flat for grinding food and are located on the top and bottom of your jaw

**Primary transfer:** the transfer of evidence directly from the source to another object

**Questioned document:** notes or written articles related to a crime scene where the author is unknown

**Request handwriting:** an example of a person's handwriting provided as part of an investigation with a witness present

**Rh factor:** a characteristic of human blood that considers whether or not the Rh protein is present in blood. People with the Rh protein are considered Rh positive. People without the Rh protein are considered Rh negative

**Ridge pattern:** the wavy pattern produced by the cells growing on your fingertips; this ridge pattern causes fingerprints, which are unique to every person

**Saliva:** the liquid secreted by glands in the mouth

**Secondary transfer:** the transfer of evidence between objects where neither object was the original source

**Solvent:** a liquid into which something will dissolve

**Statement:** a record written by an individual that describes his whereabouts and actions during a specific period of time

**Suspect:** one who authorities think may have committed a crime

**Ten Card:** a form containing fingerprints of all five fingers from the left hand and the fingerprints of all five fingers from the right hand

**Toxicologist:** a scientist that studies substances and their effect on living things

**Toxicology:** the study of substances and their effects on living things

**Toxin:** a poisonous substance that is a specific product of the metabolic activities of a living organism

**Trace evidence:** any small amount of hair, skin, fabric or any other material that may link a suspect to a crime scene

**Unique evidence:** information or clues at a crime scene that can be traced to a specific person

**Universal donor:** a person having blood type AB who can accept any type of blood

**Universal recipient:** a person having blood type O who can give their blood to any other person

**Whorl pattern:** the ridges of the fingerprint that are circular and look like a bull's-eye target

**COMMUNICATE A PROBLEM, DESIGN, AND SOLUTION.** Student abilities should include oral, written, and pictorial communication of the design process and product. The communication might be show and tell, group discussions, short written reports, or pictures, depending on the students' abilities and the design project.

**SCIENCE AS INQUIRY STANDARDS:**
Science as inquiry is basic to science education and a controlling principle in the ultimate organization and selection of students' activities. The standards on inquiry highlight the ability to conduct inquiry and develop understanding about scientific inquiry.

Engaging students in inquiry helps students develop:

- Understanding of scientific concepts
- An appreciation of "how we know" what we know in science.
- Understanding of the nature of science.
- Skills necessary to become independent inquirers about the natural world.
- The dispositions to use the skills, abilities, and attitudes associated with science.

Students at all grade levels and in every domain of science should have the opportunity to use scientific inquiry and develop the ability to think and act in ways associated with inquiry, including asking questions, planning and conducting investigations, using appropriate tools and techniques to gather data, thinking critically and logically about relationships between evidence and explanations, constructing and analyzing alternative explanations, and communicating scientific arguments.

*Material in this section was quoted from National Science Education Standards, National Committee on Science Education Standards and Assessment, National Research Council.

Our staff would be happy to help you make more connections with NSES. Please contact us for more information.

You can learn more about the National Science Education Standards. Please visit the NSES website at http://www.nap.edu/html/nses/.

## Next Generation Science Standards

In addition, *The Cookie Jar Mystery* helps learners meet the practices, cross-cutting concepts, and disciplinary core ideas that comprise the Next Generation Science Standards. The practices, concepts, and disciplinary ideas specifically covered in this unit include:

**PRACTICES:**

**Asking Questions and Defining Problems**

- Ask questions that can be investigated within the scope of the classroom, outdoor environment, and museums and other public facilities with available resources, and, when appropriate, frame a hypothesis based on observations and scientific principles.

**Planning and Carrying Out Investigations**

- Make observations and measurements to produce data to serve as the basis for evidence for an explanation of a phenomenon.
- Plan an investigation individually and collaboratively, and in the design: identify independent and dependent variables and controls, what tools are needed to do the gathering, how measurements will be recorded, and how many data are needed to support a claim.
- Conduct an investigation to produce data to serve as the basis for evidence that can meet the goals of the investigation.

**Analyzing and Interpreting Data**

- Analyze and interpret data to determine similarities and differences in findings.

**Engaging in Argument from Evidence**

- Support an argument with evidence, data, or a model.

**Scientific Knowledge is Based on Empirical Evidence**

- Science knowledge is based upon logical and

conceptual connections between evidence and explanations.

- Science disciplines share common rules of obtaining and evaluating empirical evidence.

**CROSS-CUTTING CONCEPTS:**
**Patterns**

- Patterns can be used to identify cause-and-effect relationships.
- Graphs, charts, and images can be used to identify patterns in data.

**DISCIPLINARY CORE IDEAS:**
**PS1.A: Structure and Properties of Matter**

- Measurements of a variety of properties can be used to identify materials.

**LS3.A: Inheritance of Traits**

- Variations of inherited traits between parent and offspring arise from genetic differences that result from the subset of chromosomes (and therefore genes) inherited.

**LS3.B: Variation of Traits**

- In sexually reproducing organisms, each parent contributes half of the genes acquired (at random) by the offspring. Individuals have two of each chromosome and hence two alleles of each gene, one acquired from each parent. These versions may be identical or may differ from each other.

## Common Core Learning Standards

In addition to meeting the National Science Education Standards (NSES) and Next Generation Science Standards (NGSS), this unit meets Common Core Learning Standards (CCLS) in English Language Arts and Literacy. Specific CCLS addressed include:

**CCSS.ELA-Literacy.CCRA.SL.1:**
Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively.

**CCSS.ELA-Literacy.CCRA.SL.2:**
Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally.

**CCSS.ELA-Literacy.CCRA.SL.4:**
Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience.

**CCSS.ELA-Literacy.CCRA.R.1:**
Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text.

# Standards Matrix

| Standard | Lesson | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| ***National Science Education Standards*** | | | | | | | | | | | | |
| Content Standard A : Teachers of science plan an inquiry-based science program for their students. | • | • | • | • | • | • | • | • | • | • | • | • |
| Content Standard B: Teachers of science guide and facilitate learning. | • | • | • | • | • | • | • | • | • | • | • | • |
| Content Standard E: Teachers of science develop communities of science learners that reflect the intellectual rigor of scientific inquiry and the attitudes and social values conducive to science learning. | • | • | • | • | • | • | • | • | • | • | • | • |
| Science as Inquiry | • | • | • | • | • | • | • | • | • | • | • | • |
| ***Next Generation Science Standard*** | | | | | | | | | | | | |
| Practice: Asking Questions and Defining Problems | • | • | • | • | • | • | • | • | • | • | • | • |
| Practice: Planning and Carrying Out Investigations | | • | • | • | • | • | • | • | • | • | • | |
| Practice: Analyzing and Interpreting Data | • | • | • | • | • | • | • | • | • | • | • | • |
| Practice: Engaging in Argument from Evidence | • | • | • | • | • | • | • | • | • | • | • | • |
| Practice: Scientific Knowledge is Based on Empirical Evidence | • | • | • | • | • | • | • | • | • | • | • | • |
| Cross-Cutting Concept: Patterns | | | | | | | • | | • | | • | • |
| Disciplinary Core Idea: 3-LS3-1: Inheritance and Variation of Traits - Different organisms vary in how they look and function because they have different inherited information. | | | | | • | | • | • | • | • | | |
| Disciplinary Core Idea: 5-PS1-3: Matter and It's Interactions -Make observations and measurements to identify materials based on their properties | | • | • | • | • | • | | • | | | | |
| Disciplinary Core Idea: 5-PS1-4: Matter and It's Interactions - Conduct an investigation to determine whether the mixing of two or more substances results in new substances. | | | • | | | | | • | | | | |

# Standards Matrix

| Standard | Lesson | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| ***Common Core Learning Standard*** | | | | | | | | | | | | |
| CCSS.ELA-Literacy.CCRA.SL.1: Prepare for and participate effectively in a range of conversations and collaborations with diverse partners, building on others' ideas and expressing their own clearly and persuasively. | • | • | • | • | • | • | • | • | • | • | • | • |
| CCSS.ELA-Literacy.CCRA.SL.2: Integrate and evaluate information presented in diverse media and formats, including visually, quantitatively, and orally. | • | • | • | • | • | • | • | • | • | • | • | • |
| CCSS.ELA-Literacy.CCRA.SL.4:: Present information, findings, and supporting evidence such that listeners can follow the line of reasoning and the organization, development, and style are appropriate to task, purpose, and audience. | | • | • | • | • | • | • | • | • | • | • | • |
| CCSS.ELA-Literacy.CCRA.R.1: Read closely to determine what the text says explicitly and to make logical inferences from it; cite specific textual evidence when writing or speaking to support conclusions drawn from the text. | • | • | • | • | • | • | • | • | • | • | • | |
| CCSS.ELA-LITERACY.CCRA.R.3: Analyze how and why individuals, events, or ideas develop and interact over the course of a text. | | • | • | • | • | • | • | • | • | • | • | • |
| CCSS.ELA-LITERACY.CCRA.W.1: Write arguments to support claims in an analysis of substantive topics or texts using valid reasoning and relevant and sufficient evidence. | | • | • | • | • | • | • | • | • | • | • | • |
| CCSS.ELA-LITERACY.RI.4.1: Refer to details and examples in a text when explaining what the text says explicitly and when drawing inferences from the text. | • | • | • | • | • | • | • | • | • | • | • | • |
| CCSS.MATH.CONTENT.4.MD.A.1: Know relative sizes of measurement units within one system of units | | | | | | | • | | | • | | |
| CCSS.MATH.CONTENT.5.MD.A.1: Convert among different-sized standard measurement units within a given measurement system | | | | | | | | | | • | | |

# Cracked the Cookie Jar Mystery?

## Dive into More Forensic Science Adventures!

**Rogue Rodent Mystery:**

A Crime Scene Investigation for Grades K-1

**Missing Money Mystery:**

An Introduction to Forensic Science for Grades 2-3


**Science Fair Mystery:**

A Deceitful Display Adventure for Grades 6-7

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