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| **TEXAS CTE LESSON PLAN**[www.txcte.org](http://www.txcte.org) |
| **Lesson Identification and TEKS Addressed** |
| **Career Cluster** | Law, Public Safety, Corrections & Security |
| **Course Name** | Forensic Science |
| **Lesson/Unit Title** | Questioned Documents |
| **TEKS Student Expectations** | 130.339. (c) **Knowledge and Skills**(3) The student uses scientific methods and equipment during laboratory and field investigations. (G) The student is expected to analyze, evaluate, make inferences, and predict trends from data and(H) The student is expected to communicate valid conclusions supported by the data through methods such as investigative reports, lab reports, labeled drawings, graphic organizers, journals, summaries, oral reports, and technology-based reports. (4) The student uses critical thinking, scientific reasoning, and problem solving to make informed decisions within and outside the classroom. (A) The student is expected to analyze, evaluate, and critique scientific explanations by using empirical evidence, logical reasoning, and experimental and observational testing, including examining all sides of scientific evidence of those scientific explanations, to encourage critical thinking(B) The student is expected to communicate and apply scientific information extracted from various sources such as current events, news reports, published journal articles, and marketing materials(C) The student is expected to draw inferences based on data related to criminal investigation(D) The student is expected to evaluate the impact of scientific research on criminal investigation, society, and the environment(E) The student is expected to evaluate models according to their limitations in representing biological objects or events and(F) The student is expected to research and describe the history of science and contributions of scientists within the criminal justice system.(6) The student recognizes the procedures of evidence collection while maintaining the integrity of a crime scene. (C) The student is expected to conduct a systematic search of a simulated crime scene for physical evidence following crime scene search patterns such as spiral, line, grid, and strip(D) The student is expected to apply knowledge of the elements of criminal law that guide search and seizure of persons, property, and evidence(G) The student is expected to outline the chain of custody procedure for evidence discovered in a crime scene and(H) The student is expected to demonstrate proper techniques for collecting, packaging, and preserving physical evidence found at a crime scene.(7)(A) The student is expected to demonstrate how to process trace evidence such as glass, paint, fibers, hair, soil, grass, and blood collected in a simulated crime scene. |
| **Basic Direct Teach Lesson**(Includes Special Education Modifications/Accommodations and one English Language Proficiency Standards (ELPS) Strategy) |
| **Instructional Objectives** | The student will be able to:1. Determine what a questioned document is and identify examples of it.
2. Analyze handwriting and identify its individual characteristics.
3. Identify what FISH is and its importance.
4. Recognize different types of altered documents and the techniques used to analyze them.
5. Apply knowledge that ink is a mixture and be able to demonstrate its components.
6. Apply knowledge of forgeries to real life cases.
7. Differentiate between known and manufactured materials, such as forgeries and counterfeits
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| **Rationale** | Document examination is a well-respected field of scientific study. Crimes such as forgeries and counterfeiting are on the rise. As these increases so does the need for the field of questioned documents. This field allows us to analyze handwriting, forgeries, typescript documents, and counterfeits, which makes it essential to forensic science. |
| **Duration of Lesson** |  |
| **Word Wall/Key Vocabulary***(ELPS c1a,c,f; c2b; c3a,b,d; c4c; c5b) PDAS II(5)* | Questioned Document – any document about which some issue has been raised or that is the subject of an investigation |
| **Materials/Specialized Equipment Needed** | **Materials*** Questioned Documents computer-based presentation
* *Characteristics of Handwriting Lab*
	+ Characteristics of Handwriting lab handout
	+ Characteristics Table handout
	+ Magnifying Glasses
	+ Black Pens
	+ Lined Notebook Paper
* *Forgery Handwriting Lab*
	+ Forgery Handwriting lab handout
	+ Signatures handout (one per group)
	+ Scissors (one per group) Magnifying Glasses
* *Ink Chromatography Lab*
	+ Ink Chromatography Lab handout
	+ Ink Chromatography Data handout
	+ Filter paper (can be coffee filters, paper towels or chromatography paper)
	+ Water
	+ Beakers or cups
	+ Pencils
	+ Rulers
	+ Ransom Note (written by teacher; wording is provided on the handout)
	+ 4 different black markers
* *Documents and Forgery Assignment*
	+ Documents and Forgery Assignment handout
	+ The Internet and/or books
	+ Computer-based presentation software
* Posters and markers
* Black ink pen
* Questioned Documents Exam and Key
* Discussion Rubric
* Individual Work Rubric
* Presentation Rubric
* Research Rubric
* Writing Rubric
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| **Anticipatory Set**(May include pre-assessment for prior knowledge) | Do an Internet search for the following article: Ted Kaczynski: The Unabomber by Ted Ottley. Use the article for a class discussion. Discuss the role the letter that the Unabomber mailed to the *New York Times* played in catching Ted Kaczynski. Use the Discussion Rubric for assessment. |
| **Direct Instruction \*** | 1. Questioned Document – any document about which some issue has been raised or that is the subject of an investigation
2. Document Examiners
	1. Mostly examine handwriting to originate its source or its authenticity
	2. Will also examine typed writings, computer printings, photocopies, inks, papers, and forgeries, and decode altered and charred documents
	3. May need to use microscopes, photographs, chromatography, and other lab examinations on the questioned documents
	4. Many work in federal, local, and state crime labs, but they may also work in private practices
3. Handwriting
	1. General Information
		1. Two different individuals’ handwriting cannot be identical
		2. Since handwriting is associated with mechanical, physical, a mental function, it is almost impossible to reproduce exactly
		3. Handwriting can be almost as individual as a person’s fingerprint
	2. Examining and Comparing
		1. A positive comparison must be based on an ample number of common characteristics between known and questioned writings
		2. Collecting a lot of exemplars (known writing) is critical in order to make a comparison
		3. Exemplars should contain some of the same words or combinations of letters that are present in the questioned document
		4. Forensic Information System of Handwriting (FISH) database
			1. If the document is a part of a high-profile case or is suspected to be written by a repeat offender, the document may be scanned into the FISH database
			2. This database is maintained by the U.S. Secret Service
			3. It can provide a list of “hits” based on mathematical values calculated from the scanned images, but a document examiner makes the final confirmation or elimination
		5. To determine whether the handwriting on the document is authentic, the examiner will generally examine the following twelve factors:
			1. Average amount of space between words and letters
			2. Relative height, width, and size of letters
				1. Height of the letters, including a comparison of the height of uppercase to lowercase letters
				2. Width of the letters and the space between the letters and the words
				3. Size of the letters relative to the available space
			3. Line quality – observing if the lines are smooth, free-flowing, or shaky and wavering
			4. Connecting strokes – comparing the strokes between upper and lower-case letters, and the strokes between the letters and the words
			5. Beginning and ending strokes – observing how the writer begins and ends words, numbers, and letters
			6. Pen lifts and separations
				1. How the writer stops to begin new letters and words
				2. Forgeries may have lifts or separations in unusual places, such as within a letter
			7. Shading and pen pressure – differing amounts of pressure used by the writer, that make lines light, dark, narrow, or wide
			8. Baseline habits – analyzing if the writer’s letters stay straight or move up and down compared to the baseline
			9. Slant – analyzing the writing slant: left, right or straight
			10. Unusual letter formation – such as letters with tails or letters written backwards
			11. Flourishes or embellishments – any fancy letters, curls, loops, circles, etc.
			12. Letter characteristics
				1. Completeness of closed characters such as, o, e, and a
				2. Dotting of i and j, and crossing of t
	3. Factors that can affect handwriting samples
		1. Types of writing instrument (pens, pencils, crayons, etc.)
		2. Types of writing surface (paper, wall, napkin, etc.)
		3. Underlining surface (smooth or rough)
		4. Mood of the writer (happy, depressed, angry, etc.)
		5. Age of the writer (undeveloped or shaky handwriting)
		6. Writing speed (slow or quick)
		7. Position of the writer (sitting or standing)
		8. Position of the document (flat, vertical, or horizontal surface)
		9. Environmental exposure (temperature, humidity, etc.)
		10. Other factors
			1. Consumption of alcohol and/or drugs
			2. Injury and/or illness
4. Typescript Comparisons
	1. Typescript is the result of machine-created documents, such as those created by computer printers, photocopiers, fax machines, and typewriters
	2. Defects, missing pieces, or scratches may help to identify the machine where the document originated
		1. Computer printers – identifying the kind of ink and toner can reduce the number of suspected printers used
		2. Photocopiers
			1. The debris on the glass or the mechanical portions can form distinctive patterns
			2. These marks can change over time and may help date the document
		3. Fax machines have a header on each page known as the TTI (transmitting terminal identifier) that helps identify the origin of the fax
		4. Typewriters
			1. Wear and defects in the typeface, misalignment of characters, and the ribbon can narrow down the search to the original typewriter
			2. The Haas Atlas is a catalog that is organized by typewriter name and includes font, manufacturer information, serial numbers, etc.
5. Altered Documents
	1. Documents are often altered after they have been prepared. This is sometimes done to hide their original content or create a forgery
		1. Additions
			1. Adding content to an already prepared document
			2. Infrared luminescence
				1. Emits infrared light when exposed to blue-green light
				2. Can be used to get results if a different ink is used
		2. Erasures
			1. One of the most common alterations of documents
			2. A rubber eraser, sandpaper, razor blade, or knife may be scratched against the paper’s surface in an attempt to remove writing or type
			3. This irritates the top fibers of the paper which are visible under a microscope
		3. Obliterations
			1. A document may have parts that are blotted or smeared, making the original unreadable
			2. This is usually done with strong oxidizing agents to make the ink become colorless
			3. This is not visible to the naked eye, but can be seen with microscopes, or ultraviolet or infrared lighting
		4. Charred Documents
			1. Sometimes documents are accidently or purposely charred in a fire
			2. Infrared photography or reflecting light at different
6. Other Document Challenges
	1. Indentations
		1. Most of the time an indented impression is left on a paper below the primary writing
		2. The best way to read the impression is by using an ESDA (electrostatic detection apparatus)
			1. This charges the paper
			2. Pouring toner powder over the charged paper develops the images on the indented paper
	2. Paper
		1. To identify paper, scientists may use the following characteristics
			1. Color
			2. Density
			3. Watermarks
			4. Dyes or bleaches
			5. Fluorescence under UV light
			6. Raw material the paper is made from
			7. Thickness
	3. Ink
		1. Considered a mixture, so it can be broken down into the different chemical components using the following lab tests
			1. Thin Layer Chromatography (TLC)
			2. A visible microspectrophotometer
		2. Studying the chemical composition can sometimes determine
			1. If a certain pen was used on a questioned document
			2. How long the ink has been on the paper
	4. Physical/Fracture Match of separated documents – usually these documents are cut or torn and can be linked to the original source
7. Examples of Questioned Documents
	1. Checks
	2. Licenses and Certificates
	3. Passports
	4. (Counterfeit) Money
	5. Receipts
	6. Lottery tickets
	7. Historical documents
	8. Ransom and suicide notes
8. Forgery
	1. An item prepared with the intent to deceive
	2. Types
		1. Blind forgery – made without a model of the signature or the writing being forged
		2. Simulated forgery – one made by copying a genuine signature
		3. Traced forgery – one made by tracing a genuine signature
9. Counterfeit
	1. Made in exact imitation of something important or valuable with the intention of deceit
	2. Columbia
		1. The leading manufacturer of counterfeit U.S. currency
		2. This counterfeit production supports their growing drug cartel
	3. The U.S. Bureau of Engraving and Printing has established some anti-counterfeiting security features including
		1. Watermarks – distinct images or designs put into paper during the paper-making process
		2. Color-shifting inks – ink that looks like different colors depending on the angle at which they are viewed (i.e., the number 50 on a $50 bill looks copper from one angle and green from another)
		3. Fine-line printing and microprinting – makes it difficult to achieve a high-quality reproduction with copying or scanning
		4. Enlarged, off-center portraits – provide room for the watermark and reduce wear on the portrait caused by folding
		5. Poor vision feature – the larger number on the back of bills is to help aid people with poor vision
		6. Denomination-specific security thread
			1. UV fluorescent ribbon running through the bill
			2. Guards against reprinting and bleaching
	4. Counterfeit detection pen – a security feature that businesses use to help eliminate receiving counterfeit bills
		1. The pen contains iodine and when it is used on a counterfeit bill it produces a blue-black color
		2. When used on an authentic bill, it produces a pale-yellow color that fades over time

*Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*none |
| **Guided Practice \*** | 1. Characteristics of Handwriting Lab. Have each student write a sample paragraph in his or her own handwriting and then analyze it using the twelve characteristics document examiners use in the field. Have each student use a Characteristics of Handwriting Lab, a Characteristics Table handout, magnifying glass, pen, and lined paper. See the lab handouts for more details. Use the Individual Work Rubric for assessment.
2. Forgery Handwriting Lab. Have students complete this lab with a partner. Have each student write his or her own authentic signature and then try to create a blind, a traced, and a simulated forgery of their partner’s. Have the partners try to determine the forgeries in another group’s signatures. Each student will need a Forgery Handwriting Lab handout, a magnifying glass, and a black pen. Each group will need a pair of scissors and the Signatures handout. Use the Individual Work Rubric for assessment.
3. Ink Chromatography Lab. Have students complete this lab in groups. Have the groups test known black markers using chromatography. Then have them test an unknown sample on a ransom note and compare it to the known samples to solve the case. You will need 4 different black markers for this lab. Write the ransom note on paper with one of the markers. The ransom note wording and other details are on the lab handouts (*Note*: write one ransom note for each class that participates in the lab). Each group will need the Ink Chromatography Lab handout, Ink Chromatography Data handout, filter paper, water, 5 beakers or cups, scissors, pencils, ruler, and a strip from the ransom note. You can share the 4 different black markers as a class or have 4 per group. See the lab handouts for more details. Use the Individual Work Rubric for assessment.
4. Documents and Forgery Assignment. Have students complete this assignment in groups. Have the groups research information online and/or in books; put their research in a computer-based presentation; and present it to the class. Each group will need the Documents and Forgery Assignment handout, access to the Internet, and books. Use the Research Rubric and the Presentation Rubric for assessment.

*Note: All labs are guided and can vary from class to class. Assess them based on accuracy, details, and questions answered based on their results. This should be done at the teacher’s discretion**Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*none |
| **Independent Practice/Laboratory Experience/Differentiated Activities \*** | *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*none |
| **Lesson Closure** |  |
| **Summative/End of Lesson Assessment \***  | *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*none |
| **References/Resources/****Teacher Preparation** | American Society of Questioned Document Examiners [www.asqde.org](http://www.asqde.org/) Deslich, Barbara, and John Funkhouser. *Forensic Science for High School*.Dubuque, IA: Kendall/Hunt, 2006.Saferstein, Richard. *Forensic Science: An Introduction*. Upper Saddle River,NJ: Prentice Hall, 2008.Texas Education Agency, Forensic Certification Training: Module 9, Sam Houston State UniversityDo an Internet search for the following: Ted Kaczynski: The Unabomber by Ted Ottley |
| **Additional Required Components** |
| **English Language Proficiency Standards (ELPS) Strategies** |  |
| **College and Career Readiness Connection[[1]](#footnote-1)** | Science Standards1. Foundation Skills: Scientific Applications of Communication
	1. Research skills/information literacy
		1. Use search engines, databases, and other digital electronic tools effectively to locate information.
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| **Recommended Strategies** |
| **Reading Strategies** |  |
| **Quotes** |  |
| **Multimedia/Visual Strategy****Presentation Slides + One Additional Technology Connection** |  |
| **Graphic Organizers/Handout** |  |
| **Writing Strategies****Journal Entries + 1 Additional Writing Strategy** |  |
| **Communication****90 Second Speech Topics** |  |
| **Other Essential Lesson Components** |
| **Enrichment Activity**(e.g., homework assignment) |  |
| **Family/Community Connection** |  |
| **CTSO connection(s)** | SkillsUSA |
| **Service Learning Projects** |  |

1. Visit the Texas College and Career Readiness Standards at <http://www.thecb.state.tx.us/collegereadiness/CRS.pdf>, Texas Higher Education Coordinating Board (THECB), 2009. [↑](#footnote-ref-1)