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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** | Lab Safety |
| **TEKS Student Expectations** | **130.339. (c) Knowledge and Skills**  (2) The student, for at least 40% of instructional time, conducts laboratory and/or field investigations using safe, environmentally appropriate, and ethical practices. The student is expected to:  (A) demonstrate safe practices during laboratory and field investigations  (B) demonstrate an understanding of the use and conservation of resources and the proper disposal or recycling of materials |
| **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. Demonstrate safe practices in labs and field investigations. 2. Demonstrate how to use and conserve resources in labs and how to dispose of or recycle materials in labs. |
| **Rationale** | Lab safety is one of the most fundamental lessons in any science course. Understanding and applying safety rules is required in all labs and in the field of forensic science. Knowing accurate lab safety is vital because it makes us aware of potential dangers and problems that may occur. This in turn shows us how to approach these situations and deal with them correctly and safely. |
| **Duration of Lesson** | 2.5-3 hours |
| **Word Wall/Key Vocabulary**  *(ELPS c1a,c,f; c2b; c3a,b,d; c4c; c5b) PDAS II(5)* |  |
| **Materials/Specialized Equipment Needed** | * Poster board and markers * Safety Poster Handout * MSDS Activity Worksheet * MSDS on chemicals * Lab Safety Quiz and Key * MSDS Activity Worksheet Key * Discussion Rubric * Group Evaluation * Individual Work Rubric * Presentation Rubric |
| **Anticipatory Set**  (May include pre-assessment for prior knowledge) | Demonstrate some lab behaviors for the students: some that follow safety protocol and some that do not. Have the students guess if it is a “do” or a “don’t.” For example, some safe behaviors are pulling hair back away from the face and wearing goggles. Some unsafe behaviors are horseplay in the lab and returning unused chemicals back into the original *container (Note: instead* *of demonstrating, a teacher may want to research, select, and show some* *images of examples. If you choose to demonstrate, select the unsafe* *behavior(s) with caution).* Discuss the importance of each behavior and why it is considered a “do” or a “don’t.”  Use the Discussion Rubric for assessment. |
| **Direct Instruction \*** | 1. The Purpose of Lab Safety    1. Science courses are hands-on and usually include many laboratory and/or field investigations    2. Safety in the science classroom should be the number one priority of the teachers, students, and parents    3. Knowledge of safe practices includes what to do if an emergency occurs in the class    4. Identifying potential dangers that may occur in the classroom, labs and/or field investigations could be vital to preventing accidents from happening, but only if everyone knows what to look for 2. General Safety Rules    1. Students should       1. Follow all directions given by the teacher at all times       2. Read the instructions completely before starting the lab       3. Know where all of the safety equipment is in the laboratory including, but not limited to          1. Eyewash station          2. Fire extinguisher          3. First aid kit          4. Safety shower       4. Work in a well-ventilated area and/or use the fume hood at all times       5. Always their wash hands before and after labs with soap and water       6. Keep their personal lab areas clean       7. Confirm that the lab area and all equipment is cleaned and/or unplugged before leaving       8. Notify the teacher immediately of any spills or accidents    2. Students should not       1. Begin any lab until told to do so or without the teacher present       2. Bring any food, drinks, or gum into the laboratory       3. Goof around or allow any horseplay in the lab 3. Protective Clothing and Equipment Rules    1. Eyewear       1. Safety goggles should be worn for the entirety of all labs       2. If contact lenses are worn, an eye doctor and the teacher should be consulted before performing any labs       3. Eyeglasses should never be worn in lieu of safety goggles    2. Gloves       1. No glove can protect from all hazards       2. Always check for rips, tears, or holes       3. Assess the lab and see what type of gloves are best for that situation          1. Cloth – good for light abrasives, but not for liquids          2. Rubber – good for solvents and corrosives          3. Leather – good for heat, sparks, and rough abrasives    3. Attire       1. Wear closed-toed, low, or non-heeled shoes       2. Wear long pants and long-sleeved shirts around chemicals and/or specimens       3. Wear aprons and/or lab coats during labs       4. Pull hair out of the way and away from the face       5. Do not wear loose or baggy clothing and/or dangling jewelry in the lab 4. Chemical Rules    1. Do not taste or smell any chemicals in the lab unless a teacher directs otherwise    2. To smell a chemical always “waft” it       1. Waft – wave your hand above the chemical towards your nose so that small amounts of vapor can be smelled without causing harm    3. Make sure to clearly label all chemicals for others    4. Ensure accurate use by reading the label twice before using the chemical in the lab    5. Avoid contamination by not returning used chemicals back into their original container    6. Dispose of chemicals using the method described on the container and/or the Material Safety Data Sheet (MSDS)    7. Add acid to water, never water to acid (adding water to acid could cause acid to splash out of the container and cause harm)    8. Be careful with flammable chemicals near any heat source    9. Do not take any chemicals out of the lab for any reason    10. Keep chemical containers that are not in use closed    11. Notify the teacher immediately if any chemical is spilt at any time 5. Glassware and Equipment Rules    1. Do not use dirty, chipped, or broken glassware in the lab    2. Notify the teacher immediately if/when any glassware is broken, so he or she can clean it up    3. Inform the teacher of any damaged electrical equipment    4. Use protective equipment when handling glassware (hot and cold glassware look similar) 6. Heating Substances Rules    1. Never leave any heat sources unattended (whether a hot plate or a Bunsen burner)    2. Never lean over a flame    3. Always point the open end of a heated test tube away from yourself and others    4. Always use tongs or protective gloves to handle heated glass or metal    5. Always make sure that long hair is pulled back when dealing with a flame or heat 7. Material Safety Data Sheet (MSDS)    1. MSDS’s are available for every chemical (online and/or a hardcopy is included with the chemicals when shipped)    2. MSDS’s always include the following information for a chemical       1. Chemical product information – formula, name, and company info       2. Ingredients – additional chemicals, if more than one, are listed by percentage       3. Hazards identification – products with possible health effects including the routes into the body       4. First aid measures – actions to take in case of harmful contact with a chemical       5. Firefighting measures – properties of fire and explosive       6. Accidental release measures – proper ways to clean up small and large spills       7. Handling and storage – how to properly store and handle the chemical       8. Exposure controls/Personal protection – how to help protect yourself from exposure to the chemical       9. Physical and chemical properties – odor, pH, boiling point, taste, color, etc.       10. Stability and reactivity – if a chemical is stable and/or the conditions of its instability       11. Toxicological information –mostly for medical professionals       12. Ecological information – not always considered, but can help a Hazmat team determine the environmental effects       13. Disposal considerations – the proper disposal method for the chemical       14. Transport information – the procedure for transporting the hazardous chemical       15. Regulatory information – the federal and state regulations associated with the chemical       16. Any additional information – can include references, legends, and the revision date of the most recent MSDS |
| **Guided Practice \*** | 1. Create safety posters. Divide the class into groups and assign each group a section of safety rules from the key points. Have each group review their section of rules and create a safety poster portraying them. After the poster is complete, have the groups present them to the class. This is so everyone will have an understanding of all of the sections of the safety rules (optional – the final posters may be displayed in the lab as a constant reminder). Use the Safety Poster Handout for the activity. Use the Presentation Rubric, the Individual Work Rubric and the Group Evaluation as needed for assessment. 2. MSDS Activity. Give each group an MSDS about a chemical that they may use in the lab this year (these are included with chemicals when they are shipped. If you do not have the hardcopy, find a copy on the Internet and print it). Give each student the MSDS Activity Worksheet and have them complete it using the MSDS you provide. Use the MSDS Activity Worksheet and the MSDS Activity Worksheet Key for assessment. |
| **Independent Practice/Laboratory Experience/Differentiated Activities \*** |  |
| **Lesson Closure** |  |
| **Summative/End of Lesson Assessment \*** | * Lab Safety Quiz * MSDS Activity * Group Evaluation   **Accommodations for Learning Differences:**  For reinforcement, students will create and act out “rights” and “wrongs” in the lab. Other students can guess what category they fall into. Use the Individual Work Rubric for assessment. |
| **References/Resources/**  **Teacher Preparation** | * Occupational Safety & Health Administration [www.osha.gov](http://www.osha.gov/) * Texas Education Agency, Forensic Certification Training, Sam Houston State University * Do an Internet search for the following: Flinn Scientific. |
| **Additional Required Components** | |
| **English Language Proficiency Standards (ELPS) Strategies** |  |
| **College and Career Readiness Connection[[1]](#footnote-1)** | 1. Nature of Science: Scientific Ways of Learning and Thinking   C. Collaborative and safe working practices   * + 1. Collaborate on joint projects. |
| **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) | For enrichment, students will teach a safety lesson at a nearby elementary or middle school to a class. Use the Individual Work Rubric for assessment. |
| **Family/Community Connection** |  |
| **CTSO connection(s)** | SkillsUSA |
| **Service Learning Projects** |  |
| **Lesson Notes** |  |

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)