



## FOUNDATION SKILLS

**PATHWAY:** All Pathways  
**COURSE:** All CTAE Courses  
**UNIT 7.1:** General Safety in the Classroom and Laboratory



## INTRODUCTION

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**Annotation:** Briefly describe the unit topics, tasks, methods, etc.

In this unit students will identify common hazards in the classroom and laboratory, define safety terms, explain methods of accident prevention in the laboratory, etc.

**Grade(s):**

X	9 <sup>th</sup>
X	10 <sup>th</sup>
X	11 <sup>th</sup>
X	12 <sup>th</sup>

**Time:** Two 50 minute periods.

**Author:** Dr. Frank Flanders

**Additional Author(s):**

**Students with Disabilities:**

For students with disabilities, the instructor should refer to the student's IEP to be sure that the accommodations specified are being provided. Instructors should also familiarize themselves with the provisions of Behavior Intervention Plans that may be part of a student's IEP. Frequent consultation with a student's special education instructor will be beneficial in providing appropriate differentiation.



## FOCUS STANDARDS

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**GPS Focus Standards:** Please list the standard and elements covered.

CTAE-FS-7 Safety, Health and Environment: Learners employ safety, health and environmental management systems in corporations and comprehend their importance to organizational performance and regulatory compliance.

### **National / Local Standards / Industry / ISTE:**

ESS06 Safety, Health and Environmental: Understand the importance of health, safety, and environmental management systems in organizations and their importance to organizational performance and regulatory compliance. Follow organizational policies and procedures and contribute to continuous improvement in performance and compliance.



## UNDERSTANDINGS & GOALS

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**Enduring Understandings:** Enduring understandings are statements summarizing important ideas and have lasting value beyond the classroom. They synthesize what students should understand – not just know.

- Observing safety guidelines in the classroom and laboratory is important to the safety of everyone.
- Students must ensure that the environment is safe, procedures are followed and that all equipment is in proper working order.
- Safety procedures learned in the classroom and laboratory are important skills for the work site.

**Essential Questions:** Essential questions probe for deeper meaning and understanding while fostering the development of critical thinking and problem-solving skills. Example: *Why is life-long learning important in the modern workplace?*

- How can you avoid accidents in the classroom and laboratory?
- Why is it important for everyone to follow safety procedures and guideline?
- Why is it important to maintain an organized and clean working and learning environment?

**Knowledge from this Unit:** Factual information.

- Students will know what actions should be taken in the event of an accident.
- Students will identify common hazards in the classroom and laboratory.
- Students will define safety terms.
- Students will explain methods of accident prevention in the laboratory.

- Students will describe procedures to take when an accident occurs.
- Students will explain the possible liability of employers when customers and employees are injured.
- Students will identify safety equipment in the laboratory and classroom.

**Skills from this Unit:** Performance.

- Students will demonstrate the proper procedure for lifting heavy objects to prevent back injury.
- Students will identify the location, content and use of Material Safety Data Sheets (MSDS).
- Students will prescribe safety rules for the workplace, classroom, and laboratory.



## ASSESSMENT(S)

**Assessment Method Type:** Select one or more of the following. Please consider the type(s) of differentiated instruction you will be using in the classroom.

- Pre-test
- Objective assessment - multiple-choice, true- false, etc.
  - Quizzes/Tests
  - Unit test
- Group project
- Individual project
- Self-assessment - May include practice quizzes, games, simulations, checklists, etc.
  - Self-check rubrics
  - Self-check during writing/planning process
  - Journal reflections on concepts, personal experiences and impact on one's life
  - Reflect on evaluations of work from teachers, business partners, and competition judges
  - Academic prompts
  - Practice quizzes/tests
- Subjective assessment/Informal observations
  - Essay tests
  - Observe students working with partners
  - Observe students role playing
- Peer-assessment
  - Peer editing & commentary of products/projects/presentations using rubrics
  - Peer editing and/or critiquing
- Dialogue and Discussion
  - Student/teacher conferences
  - Partner and small group discussions
  - Whole group discussions
  - Interaction with/feedback from community members/speakers and business partners
- Constructed Responses
  - Chart good reading/writing/listening/speaking habits
  - Application of skills to real-life situations/scenarios
- Post-test

**Assessment(s) Title:** Safety Exams

**Assessment(s) Description/Directions:**

Administer the safety exam and following instructions exam and review with the class. Review and re-administer the exams until all students score 100%. File exams in a safe place.

**Attachments for Assessment(s):** Please list.

Safety Exam

Following Instructions Exam



## LEARNING EXPERIENCES

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**Instructional planning:** Include lessons, activities and other learning experiences in this section with a brief description of the activities to ensure student acquisition of the knowledge and skills addressed in the standards. Complete the sequence of instruction for each lesson/task in the unit.

**Sequence of Instruction**

1. Identify the Standards. Standards should be posted in the classroom for each lesson.

CTAE-FS-7 Safety, Health and Environment: Learners employ safety, health and environmental management systems in corporations and comprehend their importance to organizational performance and regulatory compliance.

2. Review Essential Questions.

- How can you avoid accidents in the classroom and laboratory?
- Why is it important for everyone to follow safety procedures and guideline?
- Why is it important to maintain an organized and clean working and learning environment?

3. Identify and review the unit vocabulary.

Accident

Carcinogenicity

MSDS

Permissible exposure limit

“Right to Know Laws”

Toxicity

4. Lesson

1. Ask students to name some of the most dangerous occupations.
2. Ask students what makes those occupations so dangerous.
  - A. Dangerous equipment
  - B. Many times people work alone
  - C. Sometimes the noise level is too high to hear warnings or high enough to cause permanent hearing loss.
  - D. Chemical splashes
  - E. Sometimes there is a lot of heavy work (lifting causing back and muscle problems)
  - F. A lot of eye hazards (ricocheting nails, grinding, dust, etc.)
  - G. Respiratory exposure to dusts, chemicals
3. Ask students to relate stories of on-the-job accidents about which they have personal knowledge. Get students to identify the cause of the accident and identify how it could have been prevented.
4. Tell students about unique safety hazards specific to their career pathway. Explain hazards in the classroom and laboratory.
5. Take students on a walking tour of teaching facilities and point out potential hazards such as chemical storage, tools, etc.
6. Ask students to define "accident."
  - A. *"An unfortunate event causing loss or injury resulting from carelessness, unawareness, ignorance, or a combination of causes."* ( Webster's Dictionary).
  - B. A common quote is "Ah, it's not going to happen to me." To which a logical reply is, "That is why they call it an accident; nobody thinks it's going to happen to them." Young people seem to feel that way more often.
7. Demonstration:
  - A. Use the domino method outlined below to demonstrate safety prevention. The teacher will need to prepare dominos, roughly 2x6's cut into 10" lengths. Paint and label as shown on page 7.
  - B. Lead the students to identify the factors that may cause an accident and possibly injury.
    - 80% of accidents are caused by unsafe acts
    - 20% are caused by unsafe conditions
  - C. Factors: 3 categories are defined
    1. Background of a person
      - Personal habits
      - Inexperience
    2. Defects of Person
      - Lack of knowledge or skill
      - Improper attitude (not willing)
      - Physical deficiency (not able)
    3. Unsafe Acts and Conditions (Unlimited list)
  - D. Which two of the three factors above do we have the most power to correct?
    - Unsafe acts and conditions
  - E. Set up the dominos as shown in the transparency master and explain the steps.
  - F. Show how all dominos fall and result in an accident by bumping the first domino over. Then remove the "unsafe acts and conditions" domino and bump the first domino over again to show how the chain of events is broken.
8. Ask students what injury they think is the leading cause of lost work time.

- A. Back problems. Eight out of 10 people in the U.S. will consult a physician for back problems sometime in their lives.
- B. Ask students if they know of some one with back trouble. Does it go away in time? Maybe, but it almost always returns. Back trouble lasts a lifetime. Be careful.
- C. What can you do to avoid back injury? Then show the overhead and explain and demonstrate.
- D. Here are some basic principles to prevent back pain injury:
  - Avoid lifting when possible and by pushing, pulling, rolling or sliding the object.
  - Use mechanical aids (hand trucks, carts, winches, forklifts, etc.)
  - Request help from others when necessary.
  - Lift only loads you can safely handle.
  - Establish good footing.
  - Keep the loads close to body.
  - Bend at the knees as you grasp it.
  - Get a full hand grip and keep your body erect.
  - Lift smoothly by straightening the legs (avoid jerky or snatching lifts.)
  - Avoid the lift and twist action.
  - When turning, move your feet rather than twisting your body at the waist.
  - Reverse the procedure to set the object down.
  - Wear protective belt at all times when lifting.

NOTE: You may want to let everyone demonstrate with a light load to test their understanding of proper lifting techniques.

#### 9. Understanding MSDS

Make sure the students understand the use of Material Safety Data Sheets (MSDS). Show students where the MSDS are kept and explain why it is important that everyone know where they are located. Lead students to identify what information is on the MSDS?

- 1. Product identification
  - a. Specific name and common name
  - b. Precautionary labeling
  - c. Safety equipment
  - d. Precautionary label statements
  - e. Storage color code
- 2. Hazardous components
- 3. Physical data
  - a. Percentage of volatile components
  - b. Appearance and odor
- 4. Fire and explosion hazard data such as:
  - a. Fire extinguishing media and method
  - b. Special fire fighting procedures
  - c. Toxic gases produced
- 5. Health hazard data
  - a. Permissible exposure limit
  - b. Toxicity
  - c. Carcinogenicity
  - d. Effects of over exposure
  - e. Target organs (those most affected)
  - f. Medical conditions aggravated by exposure
  - g. Routes of entry
  - h. Emergency and first aid procedures
- 6. Reactivity data
  - a. Stability

- b. Hazardous polymerization
- c. Conditions to avoid
- d. Incompatible materials
- e. Decomposition products
- 7. Spill and disposal procedures
  - a. Procedures: spill or discharge
  - b. Procedures: disposal
  - c. EPA hazardous waste number
- 8. Protective equipment needed
  - a. Ventilation
  - b. Respiratory protection
  - c. Eye/skin protection
- 9. Storage and handling precautions
- 10. Transportation data and additional information

10. Computer Activity

- A. Have students look up MSDS sites on the Internet.
- B. Explain the use of Material Safety Data Sheets (MSDS)

11. On the Job Accidents

- A. Ask students if companies should be held liable for accidents such as a customer or worker getting hurt? Under what circumstances?  
Answers vary, but the conclusion should be if the employer is negligent. They are negligent if they fail to take reasonable precautions for safety of employees and customers. Many of these are complicated gray-area issues usually settled by the courts. You may wish to give the student some scenarios and ask them who is liable, if anyone. Direct them to learn more about how they can protect themselves legally in case of an accident at work.
- B. Sample scenario: A customer slips on water on the floor and injures themselves.

12. Ask students to outline what should be done in case of an emergency?

- A. Notify the teachers of any injury or hazardous situation
- B. Call 911 if teacher or other authority figures are not available
- C. If someone is injured with chemicals:
  - flush with water
  - send/take the chemical label and MSDS with the patient
- D. In the case of volatile materials, clear everyone from the area
- E. If excessive bleeding occurs, apply pressure

13. Safety Equipment

Display and discuss some of the safety equipment that may be used in the laboratory.

Examples:

- |                 |                     |
|-----------------|---------------------|
| Chemical aprons | Welding aprons      |
| Safety glasses  | Chemical spray suit |
| Welding helmet  | Hard hats           |
| Face shields    | Hearing protection  |
| Respirator      | Dust mask           |
|                 | Gloves              |

14. "Right to Know Laws"

- A. Ask the students what general safety rules should be observed in classroom and laboratory.
- B. Explain that there are laws known as "Right to Know Laws" which businesses are required to obey. These laws require that employees be made aware of hazards in the work place.

- C. Ask the students that if they had a business, what general rules of conduct would they have to protect the workers and to protect themselves from lawsuits if someone got hurt?
15. Review safety rules and policies with the class
- A. While no human activity is completely risk free, if you use common sense and a bit of knowledge or the situation, you should encounter few problems. Sensible lab conduct won't happen by memorizing a list of rules -- although they are important and do help. A perfect score on a written driver's test does not ensure you will not have an accident. The safety rules provided apply to most classes and laboratories. For your personal safety and that of your classmates, make following these guidelines second nature in the laboratory. If you understand the reasons behind them, these safety rules will be easy to remember and to follow.
  - B. Additional activities:
    - 1. Post lab safety rules in a prominent location for students to read
    - 2. Assign a safety foreman to watch for safety violations and hazardous situations.
  - C. Ask the students what they have learned about safety in the classroom.

Answers will vary but should include:

*Everyone must obey the rules to prevent accidents*

*MSDS sheets explain the hazards and action to be taken upon exposure*

*The right-to-know laws protect workers, etc.*

## 5. Assessment Activity

**Attachments for Learning Experiences:** Please list.

Following Instructions Exam

Safety Exam

General Rules of Conduct and Safety

Safety Demonstration

**Notes & Reflections:** May include notes to the teacher, pre-requisite knowledge & skills, suggestions, etc.

This lesson is about general safety practices in the classroom and laboratory. Students should be given very

specific safety instructions for the equipment and chemicals they will use in the classroom or laboratory.



## CULMINATING PERFORMANCE TASK (Optional)

**Culminating Unit Performance Task Title:**

**Culminating Unit Performance Task Description/Directions/Differentiated Instruction:**

**Attachments for Culminating Performance Task:** Please list.



# UNIT RESOURCES

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## Web Resources:

**Attachment(s):** Supplemental files not listed in assessment, learning experiences, and performance task.

## Materials & Equipment:

Chemical aprons	Welding aprons
Safety glasses	Chemical spray suit
Welding helmet	Hard hats
Face shields	Hearing protection
Respirator	Dust mask
Gloves	

## What 21st Century Technology was used in this unit:

<input type="checkbox"/>	Slide Show Software	<input type="checkbox"/>	Graphing Software	<input type="checkbox"/>	Audio File(s)
<input type="checkbox"/>	Interactive Whiteboard	<input type="checkbox"/>	Calculator	<input type="checkbox"/>	Graphic Organizer
<input type="checkbox"/>	Student Response System	<input type="checkbox"/>	Desktop Publishing	<input type="checkbox"/>	Image File(s)
<input type="checkbox"/>	Web Design Software	<input type="checkbox"/>	Blog	<input type="checkbox"/>	Video
<input type="checkbox"/>	Animation Software	<input type="checkbox"/>	Wiki	<input type="checkbox"/>	Electronic Game or Puzzle Maker
<input type="checkbox"/>	Email	<input checked="" type="checkbox"/>	Website		