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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, and Security |
| **Course Name** | Firefighter I |
| **Lesson/Unit Title** | Power Supply, Lighting Equipment, and Emergency Scene Safety |
| **TEKS Student Expectations** | **130.334. (c) Knowledge and Skills** (19) The student identifies safety procedures for ensuring a safe environment.(D) The student is expected to describe safety procedures for fire service lighting equipment such as power supply (portable or mounted), lights, cords, and connectors(E) The student is expected to describe procedures for safe operation at emergency scenes |
| **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. Describe safety procedures for fire service lighting equipment such as power supplies (portable or mounted), lights, cords, and connectors 2. Describe procedures for safe operation at emergency scenes |
| **Rationale** | Because firefighting and other fire service emergency operations can happen anytime night or day, there is a need for firefighters to be proficient in artificially lighting emergency scenes for safety and necessity. Learning how to set up power supplies and lighting units safely and efficiently is a must for overall scene safety. |
| **Duration of Lesson** | 3 hours |
| **Word Wall/Key Vocabulary***(ELPS c1a,c,f; c2b; c3a,b,d; c4c; c5b) PDAS II(5)* |  |
| **Materials/Specialized Equipment Needed** | * Power supply
* Lighting
* Power cords
* Power Supply, Lighting Equipment, and Emergency Scene Safety Quiz and Key
* Portable Power Supplies and Lighting Equipment Checklist
* Discussion Rubric
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| **Anticipatory Set**(May include pre-assessment for prior knowledge) | Engage your students in a general discussion about firefighter safety. Discuss why it is important for firefighters to understand power supplies, lighting equipment, and auxiliary electrical equipment that they use in emergency situations to establish scene safety and success. Acknowledge that failing to understand the need for these tools and their functions can ultimately result in failure as well as injuries on the fire ground. Use the Discussion Rubric for assessment. |
| **Direct Instruction \*** | I. Emergency Power and Lighting Equipment A. Nighttime operations require firefighters to be proficient in the operation of emergency power and lighting equipment 1. Power supplies are classified into one of two categories: a. Inverters – convert a vehicle’s 12- or 24-volt direct current (DC) into 110-or 220-volt alternating current (AC) i. Commonly used when small electrically powered/operated tools are needed ii. Apparatus-mounted iii. Fuel efficient iv. Make little or no noise v. Disadvantages (a) Provide a limited power supply (b) Have limited mobility from their mount on the apparatus b. Generators – normally provide 110 or 220 volts of AC power i. Portable or apparatus-mounted ii. Powered by either gasoline or diesel engines iii. Most of the portable ones can be carried by two firefighters* + 1. Are useful in areas that are not accessible to vehicle-mounted units
		2. Vehicle-mounted units provide a larger generating capacity than the portable units
			1. Provide power for floodlighting systems
			2. Can be powered by gasoline, diesel, or propane, or by hydraulic or power takeoff systems
			3. Fixed floodlight systems are generally directly wired into the generator through a switch
			4. Vehicle-mounted units with a separate engine from the drive engine are loud, and can cause problems with emergency scene communications
			5. Exhaust fumes can be of concern at emergency scenes
			6. Refueling spillage can also affect fire investigation scenes because of the increase of hydrocarbons at the scene
1. Lighting equipment is also divided into two categories
	1. Portable – can be carried and used where fixed equipment cannot
		1. Because of the distance between apparatus and the emergency scene
		2. Because there are obstructions that block light that need to be overcome
		3. Portable lights commonly range from 300 to 1000 watts of power
		4. Power can be supplied by a cord from either a vehicle-mounted power source or a portable source
		5. Many portable lights are mounted on telescoping stands which allows them to be used more effectively
	2. Fixed – vehicle-mounted
		1. Provide overall lighting at emergencies
		2. Can be easily raised, lowered, and turned for maximum effectiveness
		3. The mounting poles often allow for both vertical and horizontal movement
		4. Often mounted on a hydraulic boom with a bank of lights that can generate between 500 and 1,500 watts of power per light
		5. Lighting should be matched with the power source to be effective. Failing to do so may overtax the power source and damage the unit, restricting the availability of power for other tools and providing overall poor lighting at the scene
2. Auxiliary electrical equipment – facilitates the use of power

supplies and lighting equipment* + - 1. Electrical cables and extension cords
				1. Stored in coils, rewind reels, or portable reels
				2. Should be waterproof, intrinsically safe, adequate insulated, without exposed wires
			2. Junction boxes
				1. May be used when firefighters need to make multiple connections to operate and supply power for tools needed at the scene
				2. They are supplied by one outlet and supply several additional outlets at the scene for use
				3. Should be equipped with a ground fault circuit interrupter that conforms to NFPA 70 (Standard for Electrical Safety in the Workplace)
				4. Mutual aid agreements should ensure that cooperating departments have the same type of equipment available for use by all departments at the scene. Adapters may be necessary for this to occur

II. Equipment Maintenance* 1. Maintenance of power supplies, as well as lighting equipment and accessories, is crucial to maintaining response readiness for fire service emergency response personnel
	2. Refer to the manufacturer’s specifications and instructions for each piece of equipment to find usage and maintenance recommendations specific to it
		1. Generators (general maintenance)
			1. Inspect sparkplugs and replace if necessary
			2. Inspect the carburetor for leaks
			3. Check the fuel level and fill if necessary (fuel should be no older than three weeks old; maintain the generator with fresh fuel)
			4. Check the oil level and add as necessary
			5. Start and run the generator, and run tests as specified in maintenance manual
			6. Only certified service personnel should perform repairs on the generator
		2. Electrical equipment (general maintenance)
			1. Inspect all cords for frays, damage to the insulation, and missing or bent electrical prongs. Replace as necessary
			2. Operate and test all the lighting equipment. Check each item one at a time by plugging it into a power source. Do not test multiple cords at one time; that could cause a circuit overload
			3. Check and change light bulbs if required. Bulbs should be cool before changing them, and unplugged from the power source
		3. Work area (general maintenance)
			1. All tools and equipment need to be returned to their proper storage site to be ready for future use
			2. All maintenance and repairs on equipment need to be documented in organized maintenance logs
1. Scene Safety Using Power Supplies and Lighting Equipment
	1. NFPA 1500 limits emergency operations to those operations that can be completed safely by personnel on the scene
		1. To meet the requirements of NFPA 1500, company officers must
			1. Accept responsibility for all company members
			2. Control access to the scene
			3. Appoint a Safety Officer
			4. Use power supplies, lighting, and associated equipment to help departments maintain scene safety and the safety of firefighters working at those scenes

*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 \*** | Review of the Portable Power Supplies and Lighting Equipment Checklist. Upon completion of the skills review, students are to complete the skills under the supervision of an instructor.*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 \*** | Assigned reading on Emergency Operations and Emergency Scene Safety, classroom discussion on situational awareness.*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 \***  | Power Supply, Lighting Equipment, and Emergency Scene Safety Quiz and KeyPortable Power Supplies and Lighting Equipment ChecklistDiscussion Rubric*Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:***Accommodations for Learning Differences:**For reinforcement, students will participate in peer teaching (mentoring) and team learning, participate in guided research and note taking (web-based), and keep journals (keywords and definitions. |
| **References/Resources/****Teacher Preparation** | 0135151112, *Essentials of Firefighting* (5th Edition), International Fire Service Training Association (IFSTA) |
| **Additional Required Components** |
| **English Language Proficiency Standards (ELPS) Strategies** |  |
| **College and Career Readiness Connection[[1]](#footnote-1)** | English/Language ArtsIV. ListeningB. Listen effectively in informal and formal situations1. Listen critically and respond appropriately to presentations.
2. Listen actively and effectively in one-on-one situations
3. Listen actively and effectively in group discussions.
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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) | For enrichment, students will participate in situational awareness exercises, classroom discussions, and training exercises. |
| **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)