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| **TEXAS CTE LESSON PLAN**  [www.txcte.org](http://www.txcte.org) | |
| **Lesson Identification and TEKS Addressed** | |
| **Career Cluster** | Transportation, Distribution & Logistics |
| **Course Name** | Energy and Power of Transportation Systems |
| **Lesson/Unit Title** | Spark Plug Removal & Replacement |
| **TEKS Student Expectations** | **130.460. (c) Knowledge and Skills**  (1) The student demonstrates professional standards/employability  skills as required by business and industry. The student is expected to:   1. demonstrate the principles of group participation and   leadership related to citizenship and career preparation  (3) The student applies technical knowledge and skills to simulated  situations. The student is expected to:  (A) identify the major components in a vehicular system  (B) identify necessary maintenance and service of vehicular  systems  (C) discuss preventative maintenance plans and systems to  keep vehicular systems in operation |
| **Basic Direct Teach Lesson**  (Includes Special Education Modifications/Accommodations and  one English Language Proficiency Standards (ELPS) Strategy) | |
| **Instructional Objectives** | **Students will…**   * Diagnose common ignition problems and service an ignition system properly. |
| **Rationale** | Students need to understand the interaction between various vehicle systems, including engines, transmissions, brakes, fuel, cooling, and electrical. |
| **Duration of Lesson** | 1 – 2 45-minute periods, depending upon size of class |
| **Word Wall/Key Vocabulary**  *(ELPS c1a, c, f; c2b; c3a, b, d; c4c; c5b) PDAS II (5)* | * Spark plug * Ignition cables * Spark gap * Electrode * Insulator * Spark plug fouling * Terminal nut * Heat range |
| **Materials/Specialized Equipment Needed** | * <https://www.cteonline.org/resources/view/33880> * Torque wrench * Vehicle or engine to preform task * PPE * Fender covers * Service information * Anti-seize (check service information) |
| **Anticipatory Set**  (May include pre-assessment for prior knowledge) | Do you ever wonder why a car backfires while driving down the street? This question will be answered today. I would like each student to write down three reasons why a car backfires and we will make comparison at the end of the class while working in groups. Our findings will be different but interesting.  <https://www.cteonline.org/resources/view/35993> |
| **Direct Instruction \*** | **Lecture**  Some of today's engines use spark plugs designed to last for up to 100,000 miles, but most spark plugs need to be changed about every 30,000 miles. During a tune-up, a complete set of spark plugs is usually installed. When a spark plug is dirty or has worn electrodes, a misfire can result. Symptoms of misfire are usually only noticeable at idle.  Some spark plugs have carbon resistors. Others have a semiconductor suppressor that is not energized until 1000 volts. This kind of spark plug can be checked with an ohmmeter.  When replacing spark plugs, it is important that the correct replacement is used. The code number on the spark plug tells about the hear range, thread size, type of seat, whether the tip is extended, or whether or not it has a resistor.  The spark plug gap is usually set from the factory. It is important to double-check the gap before installation. It is not unusual to find closed gaps or gaps that have changed because of rough handling.  A wire gauge can be used to check the gap. It has an arm that is used to reposition the bendable electrode on the plug.  When installing spark plugs, it is recommended to apply a little bit of anti-seize compound on the front two threads of the plug before installation. Anti-seize is especially needed on aluminum heads to prevent electrolytic action between the steel spark plug body and aluminum head.  Spark plug gaps in older cars are specified small gaps around 0.035 inches. The gaps on newer cars can vary up to 0.80 inches. It is important to look up the specification of the gap.  Removing spark plug cables must be a careful operation if cables are to be reused. The rubber boots usually become formed to the ridges on the spark plug. They must be twisted to loosen them. Handle them only by the plug boots so they do not suffer internal breaks. Changing cables one at a time will avoid accidental mixing them up in the firing order.  *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 \*** | After the lecture, show the students a picture of spark plugs and spark plug wires and demonstrate the way the spark travels. Have a spark plug and a set of spark plug wires for each group of four students so that they can follow during demonstration the way it functions.  *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 \*** | Have students work in groups of four taking turns explaining why and when spark plugs must be changed. Show and explain how to gap a spark plug, while having the students gap a spark plug as a group. It is important to demonstrate to students the proper way to install and remove spark plug wires while the students work as a group to do the same procedure.  Pass out a hand-out to each student. On the hand-out, each student will identify the different parts of a sparkplug. Students will also identify the names of all tools necessary to remove a spark plug and spark plug wire. |
| **Lesson Closure** | Quick review of lesson; answer any questions that students may have about the lesson.  Choose individual students and ask specific questions about today's topic.  **Students will…**  Clean up shop area and put away tools.  *Individualized Education Plan (IEP) for all special education students must be followed. Examples of accommodations may include, but are not limited to:*  *NONE* |
| **Summative/End of Lesson Assessment \*** | Choose one student from each group and have him/her explain:   * The importance of having a proper spark plug * The right procedure of gapping a spark plug * The proper way to install and remove a spark plug   If the chosen student needed help, other members of the group can participate/help. (Peer teaching)  *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** | <https://www.cteonline.org/resources/view/35557>  <https://www.cteonline.org/resources/view/35991>  <https://www.cteonline.org/resources/view/36645>  <https://www.cteonline.org/resources/view/35994>  <https://www.cteonline.org/resources/view/35556>  <https://www.cteonline.org/resources/view/36642>  <https://www.cteonline.org/resources/view/35555> |
| **Additional Required Components** | |
| **English Language Proficiency Standards (ELPS) Strategies** |  |
| **College and Career Readiness Connection[[1]](#footnote-1)** | ELA II B 1a 3a  ELA II A 1a 1c 2a 2b  Cross-Disciplinary Standards I E 1b E 2a, b, c |
| **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)** | SkillsUSATexas |
| **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)