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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** | Automotive Basics |
| **Lesson/Unit Title** | Understanding, Servicing, and Repairing Braking Systems |
| **TEKS Student Expectations** | **130.447. (c) Knowledge and Skills**(3) The student demonstrates academic skills related to therequirements of automotive technology. The student is expected to:(C) demonstrate mathematical skills in performing addition, subtraction, multiplication, division, and measurements using decimals and fractions in the metric and U.S. standard systems as appropriate (4) The student understands the technical knowledge and skills of basic automotive systems. The student is expected to:(B) locate, read, and interpret vehicle maintenance and service Information (5) The student knows the functions and applications of the tools, equipment, technologies, and materials used in automotive services. The student is expected to:(A) demonstrate the proper way to safely use hand and power tools and equipment commonly employed in the maintenance and repair of vehicles(C) identify diagnostic tools and equipment(D) identify hand and shop tools and describe their proper Usage (6) The student applies technical knowledge and skills in simulated or actual work situations. The student is expected to:(C) identify brake system components, including drum, disc, power assist, and anti-lock braking system (ABS)(D) demonstrate an understanding of basic concepts related to hydraulic brakes systems, including Pascal's Theory of Hydraulics |
| **Basic Direct Teach Lesson**(Includes Special Education Modifications/Accommodations and one English Language Proficiency Standards (ELPS) Strategy) |
| **Instructional Objectives** | **Students will…*** Describe and safely use the tools necessary for servicing and repairing automotive braking systems.
* Comprehend the operation of automotive braking systems.
* Determine appropriate procedures based on applicable technical information.
* Analyze the condition of braking components.
* Compare measurements to manufacturer’s specifications.
* Prioritize and perform appropriate repairs according to manufacturer’s specifications.
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| **Rationale** | In this lesson, students willdescribe and safely use the tools necessary for servicing and repairing automotive braking systems, determine appropriate procedures, analyze the condition of braking components, compare measurements to manufacturer’s specifications, and prioritize and perform appropriate repairs according to manufacturer’s specifications. |
| **Duration of Lesson** | 5-7 45-minute class periods (estimated, will vary) |
| **Word Wall/Key Vocabulary***(ELPS c1a, c, f; c2b; c3a, b, d; c4c; c5b) PDAS II (5)* | * Kinetic friction
* Static friction
* Pascal’s laws of hydraulics
* Disc
* Drum
* Pads
* Shoe
* Calipers
* piston
* Combination valve
* Proportioning valve
* Coefficient of friction
* Torque multiplication
* Brake ratio
* Scan tools
* DVOM
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| **Materials/Specialized Equipment Needed** |  **Tools, Equipment, and Materials*** Dial indicators
* Micrometers
* Jacks / Jack stands
* Torque wrench
* Brake lathe
* Hydrometer
* Impact wrench & air tools
* Assorted hand tools
* Brake bleeding equipment
* Hazardous waste containment and disposal equipment
* PPE
* Service manuals / service information
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| **Anticipatory Set**(May include pre-assessment for prior knowledge) | * How is it that a 90-year old woman can slightly tap the brakes on a 6,000-lb. automobile and stop it safely, when it would otherwise take 2 brick walls and a freight train to stop that same vehicle?
* What is it about a brake system that allows it to do that?
* Epic Military Vehicle Brake Failure Video <http://www.dailymotion.com/video/x244994_army-truck-brake-test-epic-fail_auto>
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| **Direct Instruction \*** | * Identify tools needed to diagnose, service, and repair braking systems.
* Explain and demonstrate Pascal’s law of hydraulics – you cannot compress a liquid; explain the concept of force multiplication.
* Demonstrate procedures for disassembling and reassembling front and rear brake units.
* Demonstrate procedure for measuring wear on brake pads, drums, and rotors.
* Identify sources of technical information.
* Explain the process for determining by comparison of measurements whether components are repairable or require replacement.

*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 \*** | **Students will**…* Practice disassembling and reassembling brake components.
* Practice how to diagnose pads, rotors, and drums by measurement and comparison to specifications.
* Practice how to replace brake components after submitting measurement comparisons and diagnosis.

*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 \*** | **Students will**…* Demonstrate with a minimum of errors the correct procedure for disassembling and reassembling brake units.

*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** | **Students will**…* Visit a brake service facility and observe procedures.

*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 \***  | **Students will**…* Score 90% or better on a written test over braking system components and procedures.
* Score 90% or better on an identification test over braking system tools.

*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** | * Applicable service information, textbooks, online resources.
* Students will visit a brake service facility and observe procedures.
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| **Additional Required Components** |
| **English Language Proficiency Standards (ELPS) Strategies** |  |
| **College and Career Readiness Connection[[1]](#footnote-1)** | English Language Arts V B 3Mathematics X B 2 cScience VIII F 2 Cross-Disciplinary II A 4 d |
| **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)** | DECA, 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)