Unit 4 Brakes

Content Area: **Applied Technology**
Course(s):
Time Period: **Marking Period 1**
Length: **3 weeks**
Status: **Published**

Summary

Students will be taught the basic principles and operation of an automotive braking system. Hydraulic theory and Pascal's Law will be introduced along with component function, operation, and location. Students will also be taught basic diagnosis procedures and how to troubleshoot simple brake problems.

The goal of this unit is to teach the students the importance of the automotive braking system and how the science of hydraulics is applied to achieve the stopping of a vehicle in excess of two thousand pounds. The content introduced will be by STEM learning and incorporate the STE elements in the acronym. The Science will be in learning about the pressurization of a fluid in accordance with Pascal's Law and how it is applied in the automotive braking system. The Technology and Engineering being in the design and construction of hydraulic components and their application in a vehicle hydraulic brake system.

Revision Date: July 2025

Essential Questions

Essential Questions

What is the automotive braking system, and what is the principle on which an automotive brake system operates?

What are the major components, and how do they operate as a system?

What are the brake lines made of and why?

Enduring Understandings

An automotive braking system is a critical safety mechanism that uses friction to convert a vehicle's kinetic energy into thermal energy, safely bringing it to a stop. This process is governed by fundamental principles of physics, including friction and fluid dynamics.

The braking system functions as an integrated hydraulic system. It's a precisely engineered network where major components—such as the master cylinder, brake lines, calipers, and pads—work in concert to translate a small force applied by the driver's foot into a large, controlled clamping force at the wheels.

The use of specific materials, like steel or a similar durable alloy, for brake lines is not arbitrary. It's a deliberate engineering choice to ensure the lines can withstand the high hydraulic pressures and corrosive environments necessary for the system to operate reliably and safely over time.

Objectives

Students will know…..

how disc and drum brakes operate and the use of hydraulics in the brake system.

the components of each (disc and drum), type of brakes.

Pascal's law and how it pertains to a modern brake system.

how air affects the brake system and common problems that can occur.

Students will be skilled at…..

the identification and location of major hydraulic components

Learning Plan

Preview the essential questions and connect to learning throughout the unit.

Teacher led discussion on operation of an automotive brake system

Task sheets and hands-on application of learned material.

Written test

Closing discussion on the lesson and anticipatory set.

Assessment

Formative Assessment:

Answer essential questions in brake unit

participation in group discussion

job sheets

exit tickets

Summative Assessment:

Quizzes and test on hydraulic brake component operation, function, and purpose -

Alternative Assessment:

Presentation on brake systems

Benchmark Assessment:

Final Exam

Materials

Modern Automotive Technology text and workbook.

videos

internet

auto database

Standards

L	Language
P.1	Act as a responsible and contributing community members and employee.
9.2.12.CAP.2	Develop college and career readiness skills by participating in opportunities such as structured learning experiences, apprenticeships, and dual enrollment programs.
P.4	Demonstrate creativity and innovation.
P.6	Model integrity, ethical leadership and effective management.
9.2.12.CAP.4	Evaluate different careers and develop various plans (e.g., costs of public, private, training schools) and timetables for achieving them, including educational/training requirements, costs, loans, and debt repayment.
1.1.5	Determine goals for life-long learning and leisure opportunities for all family members.
9.2.12.CAP.5	Assess and modify a personal plan to support current interests and post-secondary plans.
P.9	Work productively in teams while using cultural/global competence.
1.1.6	Develop a life plan, including pathways to acquiring the knowledge and skills needed to achieve individual, family, and career goals.
R	Reading
W	Writing

8.1.12.AP.6	Create artifacts by using procedures within a program, combinations of data and procedures, or independent but interrelated programs.
8.2.12.EC.1	Analyze controversial technological issues and determine the degree to which individuals, businesses, and governments have an ethical role in decisions that are made.

Modifications

https://docs.google.com/spreadsheets/d/1AckQSTlNShzlM-rDV5YKYUFm2WMCxJQiS10rEZ4jCC8/edit?usp=sharing