

## Core Skills Analysis

### Science

- The student learned about the principles of mechanical systems and how various engine components interact to ensure a vehicle operates efficiently.
- They explored basic concepts of physics such as torque, force, and energy conversion within the context of automobile engines.
- Through hands-on experience, the student gained understanding of chemical reactions related to fuel combustion and emission control.
- The activity introduced the student to diagnostic processes involving sensors and electrical circuits integral to modern car systems.

### Mathematics

- The student applied measurement skills when using tools like torque wrenches and gauges to calibrate parts precisely.
- They practiced interpreting numerical data such as engine diagnostics, fluid levels, and electrical readings to assess vehicle performance.
- Mathematical reasoning was utilized when estimating time and materials needed for repairs, incorporating problem-solving skills.
- Units conversion (e.g., PSI to bar, Celsius to Fahrenheit) was necessary for understanding specifications and instructions.

### Career and Technical Education (CTE)

- The student developed practical skills in diagnosing and repairing mechanical and electronic systems in vehicles.
- They learned workplace safety protocols specific to automotive environments, including proper tool usage and hazardous material handling.
- The activity enhanced their understanding of professional and ethical responsibilities in a technical occupation.
- Time management and teamwork were implicitly involved when coordinating repair tasks and communicating with peers or supervisors.

### Tips

To deepen the student's learning experience, educators and parents can encourage exploring advanced diagnostic tools such as computerized vehicle scanners and simulation software to reinforce understanding of modern automotive technology. Integrating lessons on environmental impacts and green automotive technologies, like electric vehicles, can broaden their scientific and technical knowledge. Additional activities such as shadowing professional mechanics, engaging in small engine repairs, or participating in automotive workshops will provide practical exposure and enhance problem-solving skills. Encouraging documentation of repair processes through journaling or video can also improve communication and critical thinking abilities.

### Book Recommendations

- [Auto Repair For Dummies](#) by Deanna Sclar: An accessible guide that covers the essentials of diagnosing and fixing common car problems, suitable for beginners and those interested in auto repair careers.
- [How Cars Work](#) by Tom Newton: This book provides clear explanations of automobile mechanics with illustrations, helping young readers understand the inner workings of cars.
- [Automotive Technology: A Systems Approach](#) by Jack Erjavec and Rob Thompson: A comprehensive textbook that explores automotive systems in depth, suitable for students pursuing technical education in vehicle repair and maintenance.

## Learning Standards

- CCSS.MATH.CONTENT.HSN.Q.A.1 - Use units as a way to understand problems and to guide the solution of multi-step problems in quantitative contexts.
- CCSS.MATH.CONTENT.HSN.RN.B.3 - Explain why the sum or product of two rational numbers is rational; that the sum of a rational number and an irrational number is irrational; and the product of a nonzero rational number and an irrational number is irrational.
- NGSS HS-PS3-2 - Develop and use models to illustrate that energy at the macroscopic scale can be accounted for as a combination of energy associated with the motions of particles and energy stored in fields.
- CTE Standards - Technical Knowledge and Skills (Safety and environmental regulations in automotive technology).