

## BIG IDEAS

Vehicle operation, service, and maintenance include consideration of **social and environmental impacts**.

Personal service and maintenance interests require the evaluation and refinement of skills.

Tools and **technologies** can be adapted for specific purposes.

## Learning Standards

Curricular Competencies	Content
<p><i>Students are expected to be able to do the following:</i></p> <p><b>Applied Design</b></p> <ul style="list-style-type: none"> <li>Interpret circumstances of or factors in a particular engine challenge</li> </ul> <p><b>Defining</b></p> <ul style="list-style-type: none"> <li>Identify potential issues and troubleshoot</li> <li>Identify requirements, intended impacts, and possible unintended negative consequences of service</li> <li>Determine whether activity is collaborative or self-directed</li> </ul> <p><b>Ideating</b></p> <ul style="list-style-type: none"> <li>Generate ideas to create a range of possibilities and add to others' ideas in ways that create additional possibilities</li> <li>Critically analyze how competing social, ethical, and sustainability considerations impact creation and development of solutions</li> <li>Choose an idea to pursue and maintain an open mind about other potentially viable ideas</li> </ul> <p><b>Prototyping</b></p> <ul style="list-style-type: none"> <li>Evaluate and apply appropriate sources of information to develop a plan that includes key stages and resources</li> <li>Analyze the <b>design for the life cycle</b> and evaluate its <b>impacts</b></li> <li>Make changes to tools, materials, and procedures as needed</li> </ul> <p><b>Testing</b></p> <ul style="list-style-type: none"> <li>Identify and communicate with sources of feedback</li> </ul>	<p><i>Students are expected to know the following:</i></p> <ul style="list-style-type: none"> <li>engine design, repair, and maintenance</li> <li>valve timing, operation, and adjustment</li> <li>compression ratios</li> <li>ignition timing and adjustment</li> <li>intake and exhaust performance, enhancement, and fabrication</li> <li>fuel systems</li> <li>braking systems</li> <li>automatic and manual transmissions</li> <li>wheel size, specification, and function</li> <li>suspension systems</li> <li>relationship between performance enhancements and original equipment manufacturer (OEM) parts</li> <li>engine-related <b>diagnostic equipment</b></li> <li>hybrid and alternative fuel vehicles</li> <li>design for the life cycle</li> <li>career options and opportunities in engine design and repair</li> <li><b>interpersonal skills</b> for interacting with clients and customers</li> </ul>

Learning Standards (continued)

Curricular Competencies	Content
<ul style="list-style-type: none"> <li>• Develop an <b>appropriate test</b>, conduct the test, and collect and compile data</li> <li>• Evaluate ideas based on information from feedback and testing results to make necessary changes</li> </ul> <p><b>Making</b></p> <ul style="list-style-type: none"> <li>• Identify appropriate tools, technologies, materials, processes, and time needed</li> <li>• Carry out updated plan, incorporating feedback from self and others and from testing results</li> <li>• Use materials in ways that minimize waste</li> </ul> <p><b>Sharing</b></p> <ul style="list-style-type: none"> <li>• Decide how and with whom to <b>share</b> their processes, to solicit and generate feedback</li> <li>• Share final plans, products and processes to evaluate their success</li> <li>• Critically reflect on plans, products and processes, and identify new goals</li> <li>• Identify and analyze new possibilities for plans, products and processes, including how they or others might build on them</li> </ul> <p><b>Applied Skills</b></p> <ul style="list-style-type: none"> <li>• Apply safety procedures for themselves, co-workers, and operators in both physical and digital environments</li> <li>• Individually or collaboratively identify and assess skills needed for automotive service plans, products and processes</li> <li>• Demonstrate competency and proficiency in skills at various levels involving manual dexterity and complex mechanics and maintenance</li> <li>• Develop specific plans to learn or refine identified skills over time</li> </ul> <p><b>Applied Technologies</b></p> <ul style="list-style-type: none"> <li>• Explore existing, new, and emerging tools, technologies, and systems to evaluate suitability for project interests</li> <li>• Evaluate impacts, including unintended negative consequences, of choices made about technology use</li> <li>• Analyze the role that advancing technologies play in engine-related contexts</li> </ul>	