# Unit 3 Engine Fundamentals

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

## Summary

Students will be taught the basic components, function, and operation of a simple four-stroke internal combustion engine. They will be taught how the engine is used as the power plant of the vehicle. The cause and correction of minor problems that can occur will also be studied.

The goal of this unit is to give students a basic understanding of how an engine works, and how it is used on many applications to perform various jobs. The content will be the understanding of how simple tools are used to create a complex machine to do work. The content introduced will be in accordance with STEAM learning and incorporate all the elements of the acronym. The Science (Physics) of how work is done. The Technology of how a complex machine is developed using all of the Six Simple Machines. The Engineering of such a machine. The Art (or as I like to say, Automotive) in the design of an aesthetically pleasing automobile, and the Math involved in making all the elements of an automobile come together to provide a means of transportation and joy.

Revised July 2025

## Essential Questions

### Essential Questions

How does the conversion of chemical energy into mechanical energy through a four-stroke cycle drive the operation of an internal combustion engine?

What is the critical sequence of events in each of the four strokes, and how does this precise timing ensure the continuous creation of power?

How do the individual components of an engine—such as pistons, cylinders, and valves—work together as an integrated system to produce usable power?

### Enduring Understandings

Students will understand the function, purpose and basic workings of an Internal Combustion Engine.

The four-stroke internal combustion engine operates on a fundamental thermodynamic principle, where a carefully timed cycle of intake, compression, combustion, and exhaust converts fuel into motion.

Each of the four strokes has a distinct and essential purpose, and the failure of any one stroke compromises the entire system's ability to generate power.

An internal combustion engine is a complex, integrated system where the coordinated movement of many

components is necessary to translate the energy from a small explosion into rotational motion

## Objectives

Students will know…..

what a four stroke internal combustion engine is

what a misfire is and what may be the cause.

how a crankshaft and camshaft work together in an internal combustion engine.

Students will be skilled at…..

determining how the major components work together to create power

simple diagnostic procedures to determine the cause of minor problems

the use of various tools to perform specific tasks

## Learning Plan

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

**Teacher led discussion on operation of a four-stroke internal combustion engine**

**Use of video and internet information.**

**Use of Modern Automotive Technology text and workbook chapter 11.**

**Task sheets and hands on application of learned material.**

**Guiding questions throughout the lesson to determine level of understanding.**

**Closing discussion and anticipatory set.**

## Assessment

**Formative Assessment:**

answer essential questions

exit tickets

job sheets

participation in group discussion

**Summative Assessment**

quizzes and test on engine operation and component function and purpose

**Alternative Assessment:**

Presentation on engine operation

**Benchmark Assessment:**

Final Exam

## Materials

Modern Automotive Technology text and workbook Chapter 11

Related Job Sheets

Visual aids

Auto Data Dase

## Standards

| | |
|---|---|
| ELA.L | Language |
| ELA.R | Reading |
| ELA.W | Writing |
| CS.9-12.8.1.12.AP.5 | Decompose problems into smaller components through systematic analysis, using constructs such as procedures, modules, and/or objects. |
| CS.9-12.8.1.12.CS.4 | Develop guidelines that convey systematic troubleshooting strategies that others can use to identify and fix errors. |
| CS.9-12.8.2.12.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. |
| WRK.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. |
| WRK.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. |
| WRK.9.2.12.CAP.5 | Assess and modify a personal plan to support current interests and post-secondary plans. |
| FCSE.9-12.1.1.5 | Determine goals for life-long learning and leisure opportunities for all family members. |
| FCSE.9-12.1.1.6 | Develop a life plan, including pathways to acquiring the knowledge and skills needed to achieve individual, family, and career goals. |
| FCSE.9-12.1.2.2 | Demonstrate job seeking and job keeping skills. |
| FCSE.9-12.1.2.4 | Demonstrate teamwork skills in school, community and workplace settings and with diverse populations. |

## Modifications

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