

Learning Outcomes – Engines Essentials

Series Learning Outcomes

At the end of this series you'll be able to:

- Describe the foundational engine cycle process that allows engines to work
- Define the different uses and sizes of engines used around the world
- Identify the key components of the engine in your own vehicle or those around you
- Cite the different fuels, improvements and engine formats that are used, and describe the benefits and drawbacks of each
- Define the new components within hybrid and electric engines, and describe the benefits and drawbacks of each
- And contrast key considerations in the creation and operation of engines; such as safety, cost, environment, physics, economics, ease of construction and maintenance, and waste

Video 2 Learning Outcomes – Core Concept

At the end of this video you'll be able to:

- Identify the key components of a single cylinder engine
- Describe the function of each component
- Define the basic engine cycle process
- Describe how the single cylinder engine fits into the bigger picture
- Describe the energy transfer process occurring inside the engine
- And identify key considerations in the creation and operation of engines; such as safety, cost, environment, physics, economics, ease of construction and maintenance, waste, and social effects

Video 3 Learning Outcomes – Uses and Popularity

At the end of this video you'll be able to:

- Identify the tasks that engines are for
- Define power and horsepower
- Quantify the approximate power output of different engines
- Quantify the number of engines in each size range in currently in use
- Describe why engines are important to humanity

- And identify key considerations in selection of engine for a particular uses; namely, finding the right balance between size and power, and cost to manufacture and maintain

Video 4 Learning Outcomes – Your Car Engine

At the end of this video you'll be able to:

- Identify the visible components of a popular car, a Hyundai Elantra
- Identify the hidden components of the car
- Define the purpose of each component
- Describe some popular transmission designs
- And describe key considerations in selection of engine for a particular uses; namely, finding the right balance between size and power, cost to manufacture and maintain, and its ability to operate under a number of conditions.

Video 5 Learning Outcomes – The 4-Stroke Engine

At the end of this video you'll be able to:

- Identify popular engine cycle models
- Define the four strokes of a 4-stroke engine cycle
- Define the purpose of each stroke
- Describe the characteristics of each stroke
- And describe key considerations in designing and engine through the lens of the engine cycle, namely; air flow, structure, lubrication, vibrations, hot and cool spots and wear.

Video 6 Learning Outcomes – Petrol vs Diesel vs LPG

At the end of this video you'll be able to:

- Identify popular engine fuels used in automobiles
- Describe the differences between each fuel
- Describe the vehicle modifications for each fuel
- Define Octane numbers and their use
- And describe key considerations in designing an engine regarding fuel choice

Video 7 Learning Outcomes – Engine Improvements

At the end of this video you'll be able to:

- Identify popular engine improvements such as carburettors and fuel injection, superchargers and turbochargers, valves and valve control, and computational fluid dynamics
- Describe the differences between carburettors, fuel injectors and direct injection
- Describe the differences and benefits of superchargers and turbochargers
- Describe the improvements possible through valve adjustment and timing
- Describe the Computation Fluid Dynamics process
- And describe key considerations in designing an engine regarding these engine improvements

Video 8 Learning Outcomes – Other Types of Engines

At the end of this video you'll be able to:

- Identify popular engine types including two-stroke engines, rotary engines, inline and V-engines, and radial engines
- Describe the form and function of each type of engine
- Define the most common applications for each type of engine
- Describe the strengths and drawbacks for each type of engine
- And describe key considerations in selecting an engine of these types

Video 9 Learning Outcomes – Hybrids and Electrics

At the end of this video you'll be able to:

- Identify limited- or non-petrol engines becoming popular in vehicles
- Describe the form and function of each type of engine
- Describe the strengths and drawbacks of each type of engine
- And describe key considerations in selecting an engine of these types, namely, range, complexity, cost, efficiency and recharging