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The four-stroke cycle

NASA's four piston strokes, with the Energy Department's four processes kept in their own box.

NASA's Glenn Research Center, writing about the Wright brothers' 1903 engine, says: "The engine is called a four-stroke engine because there are four movements (strokes) of the piston during one cycle." "In an internal combustion engine, fuel and air are ignited inside a cylinder. The hot exhaust gas pushes a piston in the cylinder which is connected to a crankshaft to produce power."

Stroke (NASA)	Official wording, from "Engine Mechanical Operation"
Intake	The intake valve is open and "fuel and air are drawn past the valve and into the combustion chamber and cylinder." The exhaust valve is closed. The mixture is "at a relatively low pressure (near atmospheric)."
Compression	"With both valves closed," the cylinder is a closed vessel. "The volume is reduced and the fuel/air mixture is compressed." "As the volume is decreased... the pressure in the gas is increased."
Power	A spark ignites the mixture. Combustion "takes place in a totally enclosed (and nearly constant volume) vessel." The pressure rises, "the hot gas does work on the piston," and the piston rod turns the crankshaft.
Exhaust	"The purpose of the exhaust stroke is to clear the cylinder of the spent exhaust." The exhaust valve is opened "by the cam pushing on the rocker arm," and the spent gas is pushed out.

A second official grouping

A U.S. Department of Energy page on engines currently in production says a four-stroke cycle "includes four distinct processes: intake, compression, combustion and power stroke, and exhaust." That grouping — with "combustion and power stroke" as one of four processes — is the Energy Department's, and is not rewritten into NASA's four piston strokes.

A short quiz

1. According to NASA, how many movements of the piston make one cycle in a four-stroke engine?
2. On NASA's mechanical-operation page, which valve is open during the intake stroke?
3. Which official page groups "combustion and power stroke" as one of four processes?

Answers. 1. Four. 2. The intake valve (the exhaust valve is closed). 3. The U.S. Department of Energy's "Internal Combustion Engine Basics."

Wording from NASA Glenn, "Internal Combustion Engine – Otto Cycle" and "Engine Mechanical Operation," and from the U.S. Department of Energy, "Internal Combustion Engine Basics." Checked 17 November 2026.