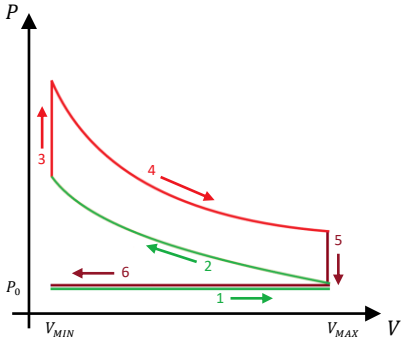
CONCEPT: THE OTTO CYCLE

- Remember! The common gasoline engine in cars is a FOUR-STROKE engine
  - The four strokes are: INTAKE, COMPRESSION, EXPANSION, and EXHAUST
  - In between the compression and expansion strokes is IGNITION

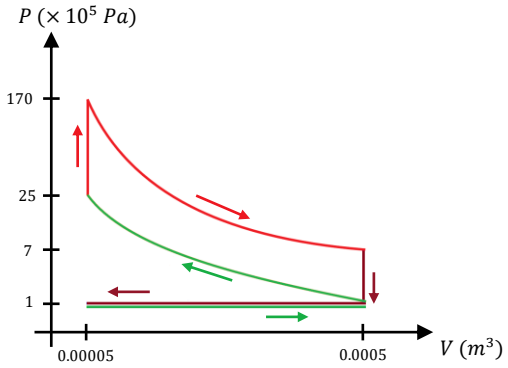
- The OTTO CYCLE is the theoretical cycle an ideal gas would undergo in a four-stroke, internal combustion engine

- The OTTO CYCLE has 6 steps:
  - Step 1: The INTAKE stroke
  - Step 2: The COMPRESSION stroke
  - Step 3: IGNITION
  - Step 4: The EXPANSION stroke
  - Step 5: De-pressurization of the exhaust, releasing heat from the piston
  - Step 6: The EXHAUST stroke



- In the Otto cycle,
  - Step 1 Is an _____ expansion
  - Step 2 is an _____ compression
  - Step 3 is an _____ pressurization
  - Step 4 is an _____ expansion
  - Step 5 is an _____ de-pressurization
  - Step 6 is an _____ compression

EXAMPLE: How much work is done by the gas in the Otto cycle shown in the following figure? Is this work done on or by the gas? Estimate the work done by finding the area enclosed by the cycle.



EXAMPLE: EFFICIENCY OF OTTO CYCLE

3 moles of an ideal, diatomic gas (with rigid molecular bonds) undergoes the following Otto cycle. How much heat is input by the spark plug? How much heat is output by the exhaust of the engine? How much work is done by this engine? What is the efficiency of the gasoline engine? **DO NOT** estimate the work done by finding the area enclosed by the cycle.