



# Science Virtual Learning

## MPI Physics 240

### Thermodynamics 21: Cyclic Processes

May 20, 2020



Lesson: MPI Thermodynamics 20  
Cyclic Processes  
May 20, 2020

**Objective: To understand thermodynamic processes that go through a repetitive cycle of steps, like an engine**

This video discusses systems that go through a repeating set of thermodynamic steps, and how they are represented on p-V diagrams

<https://youtu.be/C7tJlcYoySg>

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Video: Cyclic Processes



An engine is comprised of a piston, which contains a diatomic gas. The gas starts with a volume of 1.00 L and pressure of 1.00 atm at 300 K (Point A). Heat is then added to the piston at constant volume until the temperature reaches 900 K (Point B). The piston is allowed to expand isothermally back to a pressure of 1.00 atm (Point C). The piston is then compressed isobarically back to its starting point (Point A).

- a) Draw a p-V diagram of the process
- b) Calculate p, V, and T at points A, B, and C.
- c) Calculate Q and W for each step of the cycle (A→B, B→C, C→A).
- d) Calculate the efficiency of this engine.

Video: <https://youtu.be/e3GCRbbBQOE>

## Example Video



# Homework

An engine is comprised of a piston, which contains a diatomic gas. The gas starts with a volume of 8.00 L and pressure of 1.00 atm at 300 K (Point A). The piston is then compressed isothermally until it reaches a volume of 1.50 L (Point B). The gas is then allowed to expand isobarically back to its original volume of 8.00 L (Point C). Heat is then removed from the gas at a constant volume until it reaches its starting point (Point A).

a) Draw a p-V diagram of the process

b) Calculate p, V, and T at points A, B, and C.

c) Calculate Q and W for each step of the cycle (A→B, B→C, C→A).

d) Calculate the efficiency of this engine.

- Try to solve the problem yourself, then watch the solution video:
- <https://youtu.be/62pLS74HxSw>

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That's it!

