

# CH365 Chemical Engineering Thermodynamics

## Lesson 2 Fundamentals 2

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# Work

When a force acts over a distance, work is force times displacement:

force is  $F$  and displacement is  $dl$

Eq. 1.2       $dW = F dl$       positive (+) if  $F$  and  $dl$  are in the same direction  
negative (-) if  $F$  and  $dl$  are in the opposite direction

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Take Notes!

# Energy and Work Overview

Slide 3

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Take Notes!

# Heat

“Flows” from region of higher T to region of lower T

Take Notes Here!

Temperature difference is the “driving force” for the flow of energy as heat

Take Notes Here!

The driving force analogy comes from physics:

- voltage difference drives current flow in an electrical circuit
- gravitational potential drives free fall of an object
- pressure difference drives fluid flow in a horizontal pipe
- concentration difference drives molecular diffusion

Heat is transferred between the system and its surroundings.

Take Notes Here!

1 calorie raises the temperature of 1 gram of water 1 deg C

1 Btu raises the temperature of 1 lb<sub>m</sub> of water 1 deg F

Take Notes Here!

# Questions?