

KEY IDEAS

Section 1 Temperature and Thermal Equilibrium

- Temperature can be changed by transferring energy to or from a substance.
- Thermal equilibrium is the condition in which the temperature of two objects in physical contact with each other is the same.
- The most common temperature scales are the Fahrenheit, Celsius, and Kelvin (or absolute) scales.

Section 2 Defining Heat

- Heat is energy that is transferred from objects at higher temperatures to objects at lower temperatures.
- Energy is transferred by thermal conduction through particle collisions.
- Energy is conserved when mechanical energy and internal energy are taken into account. Thus, for a closed system, the sum of the changes in kinetic energy, potential energy, and internal energy must equal zero.

Section 3 Changes in Temperature and Phase

- Specific heat capacity is a measure of the energy needed to change a substance's temperature.
- By convention, the energy that is gained by a substance is positive, and the energy that is released by a substance is negative.
- Latent heat is the energy required to change the phase of a substance.

KEY TERMS

temperature (p. 299)

internal energy (p. 299)

thermal equilibrium (p. 300)

heat (p. 305)

specific heat capacity (p. 313)

calorimetry (p. 314)

phase change (p. 318)

latent heat (p. 318)

Variable Symbols

Quantities		Units	
T	temperature (Kelvin)	K	kelvins
T_C	temperature (Celsius)	$^{\circ}\text{C}$	degrees Celsius
T_F	temperature (Fahrenheit)	$^{\circ}\text{F}$	degrees Fahrenheit
ΔU	change in internal energy	J	joules
Q	heat	J	joules
c_p	specific heat capacity at constant pressure	$\frac{\text{J}}{\text{kg} \cdot ^{\circ}\text{C}}$	
L	latent heat	$\frac{\text{J}}{\text{kg}}$	

PROBLEM SOLVING

See **Appendix D: Equations** for a summary of the equations introduced in this chapter. If you need more problem-solving practice, see **Appendix I: Additional Problems**.