# Unit 5: Work & Energy

**Text:**
Chapter 7: Skip Sections 7-7 and 7-8.
Chapter 8: Skip Sections 8-5, 8-8, and 8-9.

*Questions (p. 180-81)*
6, 7, 11, 15

*Exercises & Problems (p. 181-86)*

| | |
|---|---|
| #1: 2, 3, 5, 10, 11, 13, 14, 19 | *(work definition)* |
| #2: 26, 28, 30, 32, 35, 38 | *(work = $\Delta KE$)* |
| #3: 39, 41, 44, 47, 49 | (power) |

*Questions (p. 211)*
6, 14

*Exercises & Problems (p. 212-24)*

| | |
|---|---|
| #4: 1, 3, 5, 6, 7, 11, 12, 13 | *(conservation of energy – no friction)* |
| #5: 16, 19, 21, 25, 30, 31, 37 | *(conservation of energy – no friction)* |
| #6: 42, 44, 47, 50, 55, 59, 63, 64, 65 | *(conservation of energy – with friction)* |
| #7: 67, 69, 71, 77, 81 | *(conservation of energy – with friction* |

**Vocabulary:**
Work, kinetic energy, potential energy, spring constant, power, Joule, Watt, conservation of energy, conservative force, non-conservative force, simple machine, pulley, ramp, lever

**Math:**
definitions: $W = Fd\cos\theta$ $KE = \frac{1}{2}mv^2$ $P = \frac{dW}{dt}$

$W = \int \vec{F}\ d\vec{x}$ (not really needed.)

derived formulas: $P = Fv$ $PE_{gravity} = mg\Delta h$ $PE_{spring} = \frac{1}{2}kx^2$

skills: no new math skills

**Key Objectives:**
- explain and apply the Work-Kinetic Energy Theorem.
- explain and apply the Law of Conservation of Energy.
- define and give examples for the vocabulary listed above.
- explain/derive the various formulas for this unit.
- explain the difference between a conservative force and a non-conservative force, with examples.
- solve a variety of word problems involving work and energy, including frictional and spring forces.
- explain how simple machines work in terms of energy principles.