

CHAPTER OVERVIEW

7: Work and energy

In this chapter, we introduce a new way to build models derived from Newton's theory of classical physics. We will introduce the concepts of work and energy, which will allow us to model situations using scalar quantities, such as energy, instead of vector quantities, such as forces. It is important to remember that even when we are using energy and work, these tools are derived from Newton's Laws; that is, we may not be using Newton's Second Law explicitly, but the models that we develop are still based on the same theory of classical physics.

Learning Objectives

- Understand the concept of work and how to calculate the work done by a force.
- Understand the concept of the net work done on an object and how that relates to a change in speed of the object.
- Understand the concept of kinetic energy and where it comes from.
- Understand the concept of power.

prelude

You are holding a heavy book with your arm extended horizontally. The book does not move as you struggle to keep it from falling to the ground. Does your arm do work on the book? If you start walking to class while holding the book, does your arm do work on the book?

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[7.2: Kinetic energy and the work energy theorem](#)

[7.3: Using PhET to Study the Work-Energy Theorem](#)

[7.4: Calculating Work Numerically](#)

[7.5: Power](#)

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