

UNIVERSITY PHYSICS

Chapter 8 POTENTIAL ENERGY AND CONSERVATION OF ENERGY

PowerPoint Image Slideshow

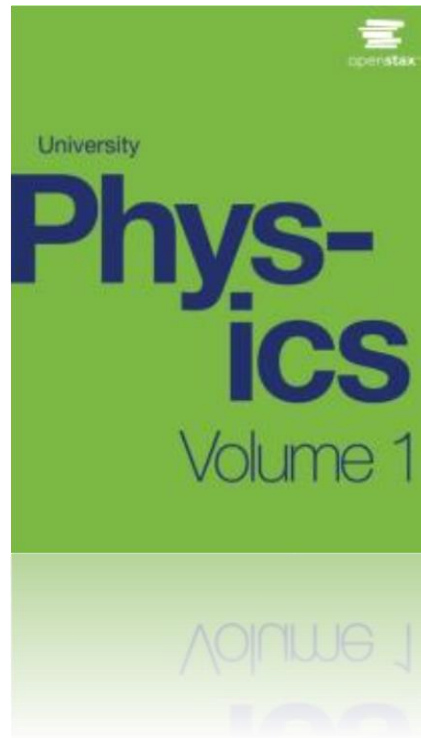
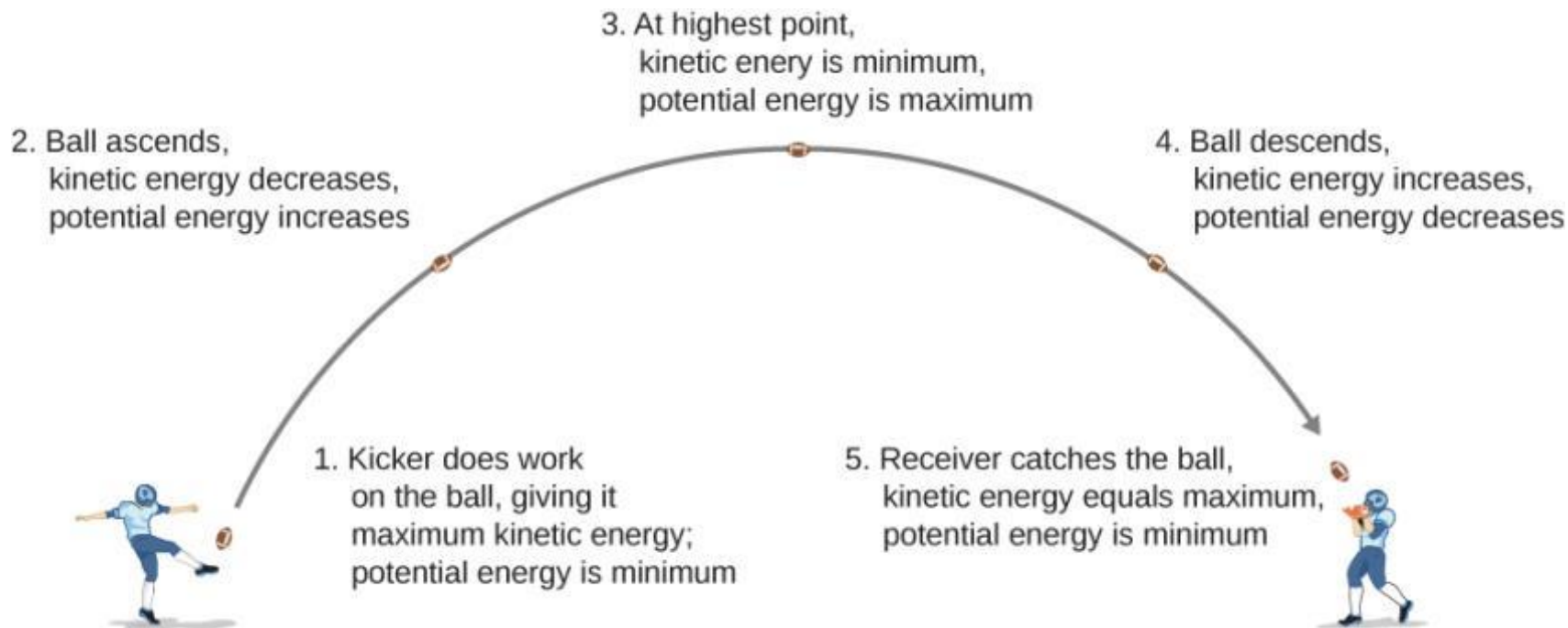


FIGURE 8.1



Shown here is part of a Ball Machine sculpture by George Rhoads. A ball in this contraption is lifted, rolls, falls, bounces, and collides with various objects, but throughout its travels, its kinetic energy changes in definite, predictable amounts, which depend on its position and the objects with which it interacts. (credit: modification of work by Roland Tanglao)

FIGURE 8.2



As a football starts its descent toward the wide receiver, gravitational potential energy is converted back into kinetic energy.

FIGURE 8.3



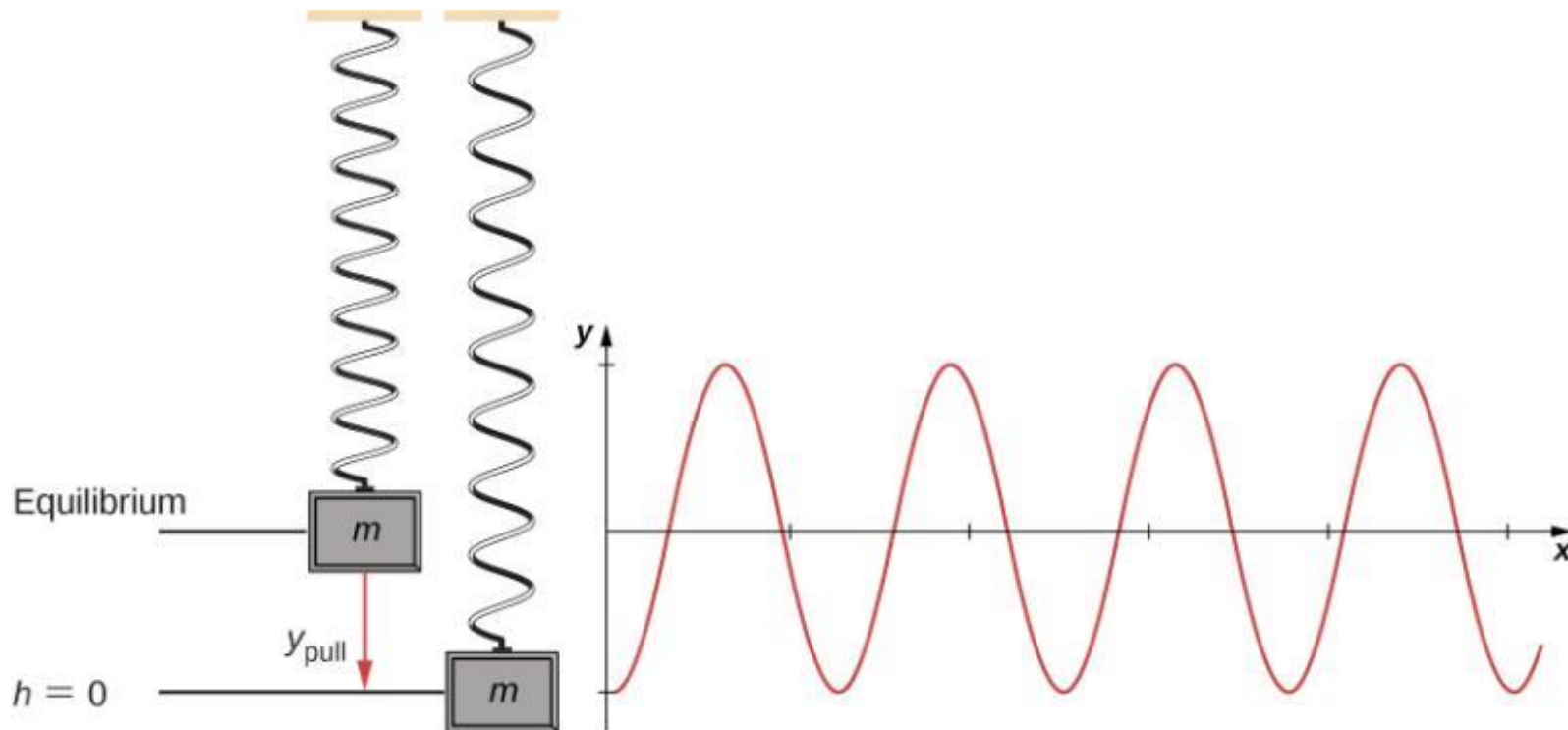
Don't jump—you have so much potential (gravitational potential energy, that is). (credit: Andy Spearing)

FIGURE 8.4



Sketch of the profile of Great Blue Hill, Milton, MA. The altitudes of the three levels are indicated.

FIGURE 8.5



A vertical mass-spring system, with the y -axis pointing upwards. The mass is initially at an equilibrium position and pulled downward to y_{pull} . An oscillation begins, centered at the equilibrium position.

FIGURE 8.6



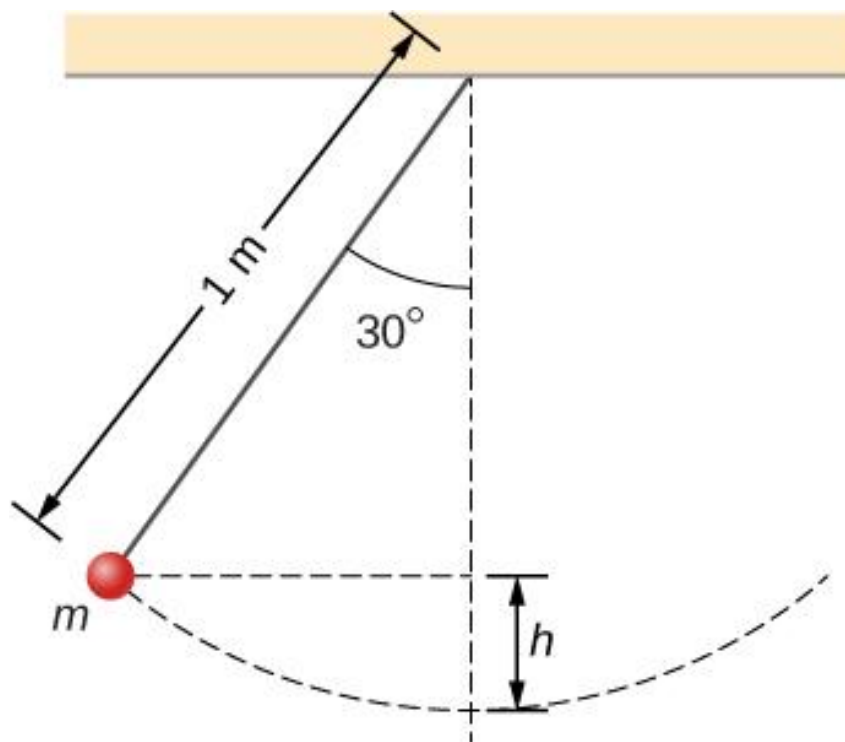
A bungee jumper transforms gravitational potential energy at the start of the jump into elastic potential energy at the bottom of the jump.

FIGURE 8.7



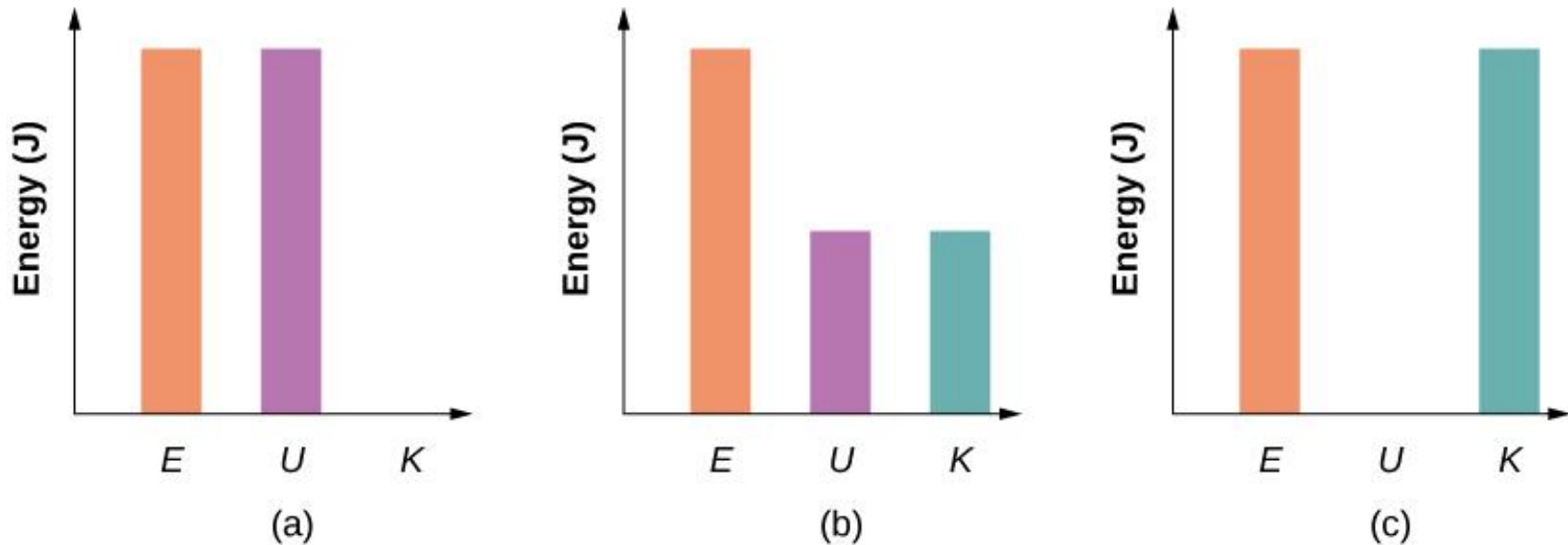
A grinding wheel applies a non-conservative force, because the work done depends on how many rotations the wheel makes, so it is path-dependent.

FIGURE 8.8



A particle hung from a string constitutes a simple pendulum. It is shown when released from rest, along with some distances used in analyzing the motion.

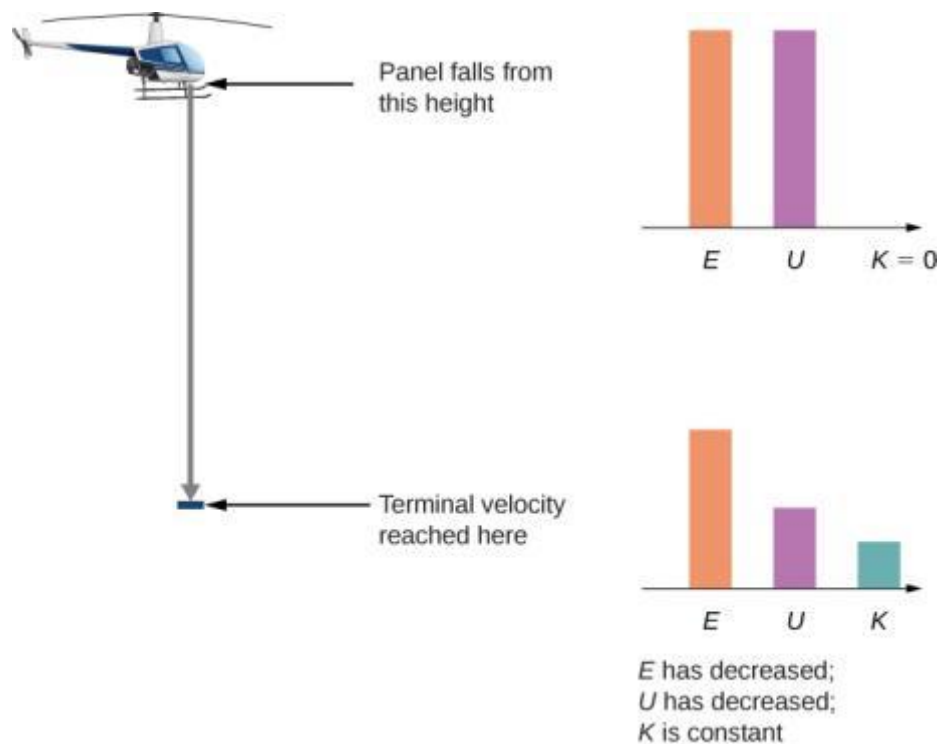
FIGURE 8.9



Bar graphs representing the total energy (E), potential energy (U), and kinetic energy (K) of the particle in different positions.

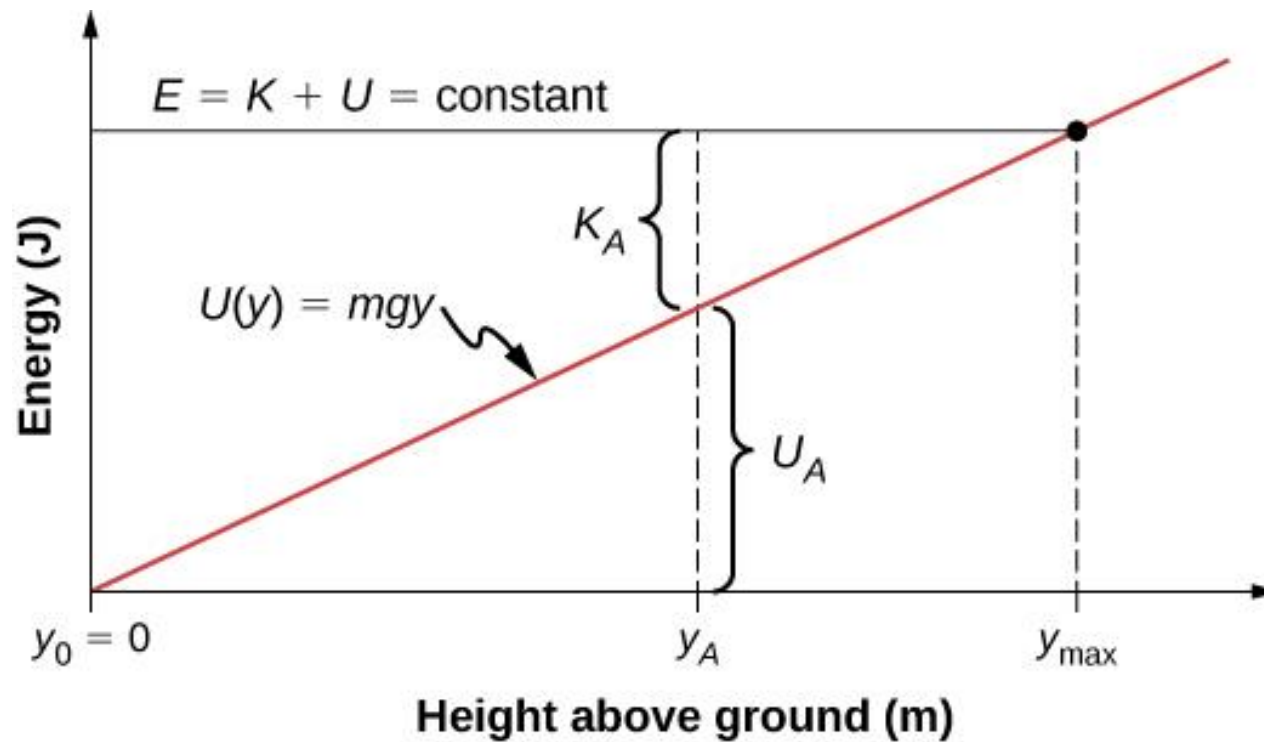
- (a) The total energy of the system equals the potential energy and the kinetic energy is zero, which is found at the highest point the particle reaches.
- (b) The particle is midway between the highest and lowest point, so the kinetic energy plus potential energy bar graphs equal the total energy.
- (c) The particle is at the lowest point of the swing, so the kinetic energy bar graph is the highest and equal to the total energy of the system.

FIGURE 8.10



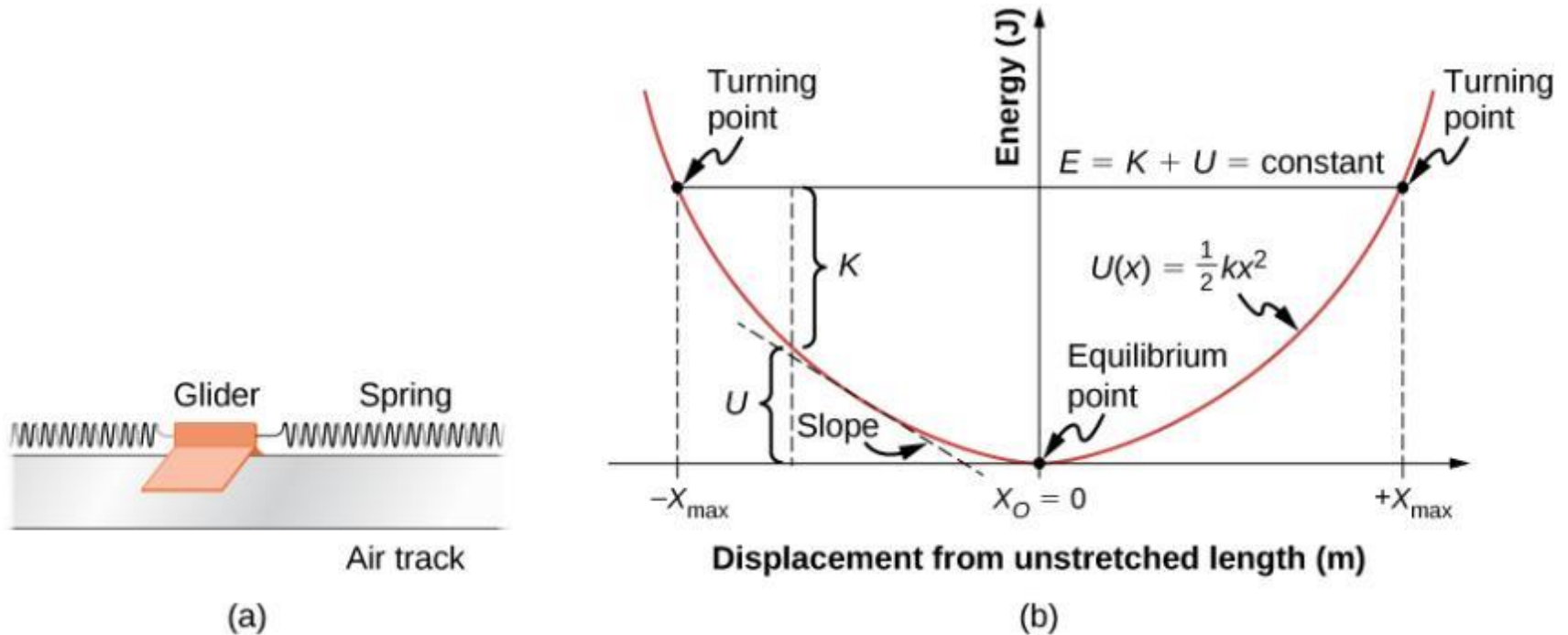
A helicopter loses a panel that falls until it reaches terminal velocity of 45 m/s. How much did air resistance contribute to the dissipation of energy in this problem?

FIGURE 8.11



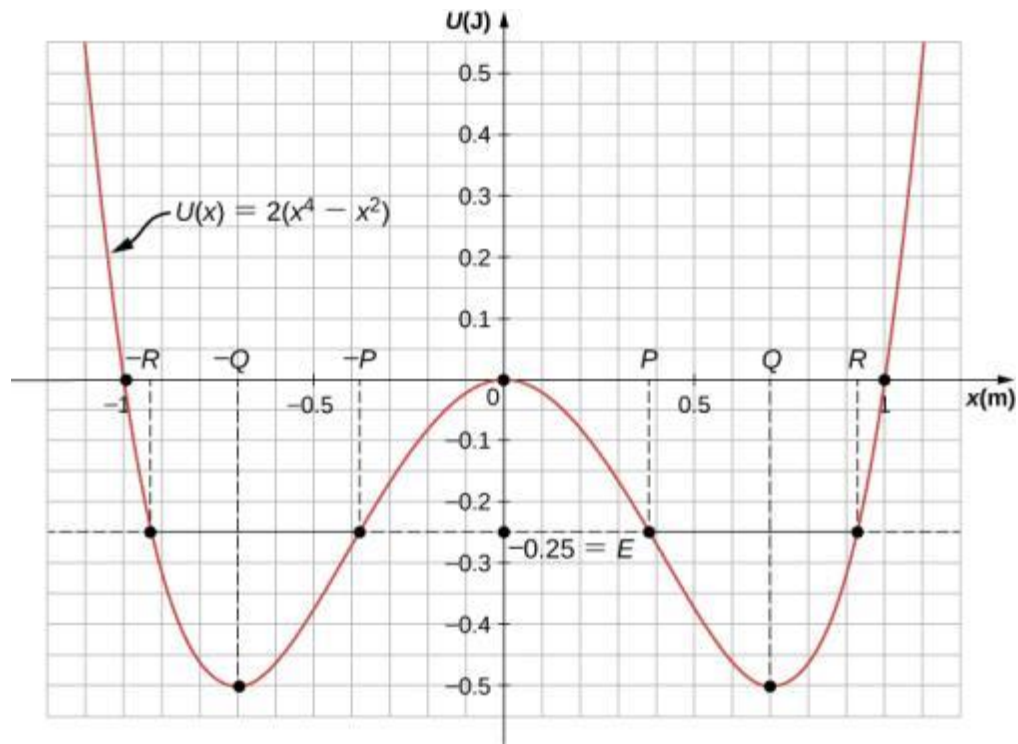
The potential energy graph for an object in vertical free fall, with various quantities indicated.

FIGURE 8.12



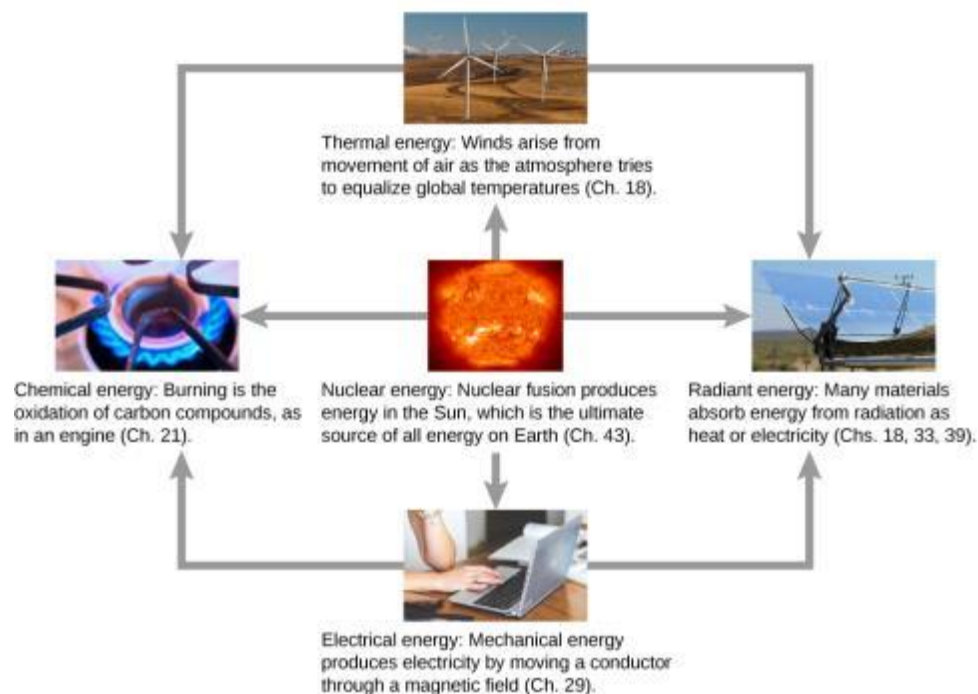
- (a) A glider between springs on an air track is an example of a horizontal mass-spring system.
- (b) The potential energy diagram for this system, with various quantities indicated.

FIGURE 8.13



The potential energy graph for a one-dimensional, quartic and quadratic potential energy, with various quantities indicated.

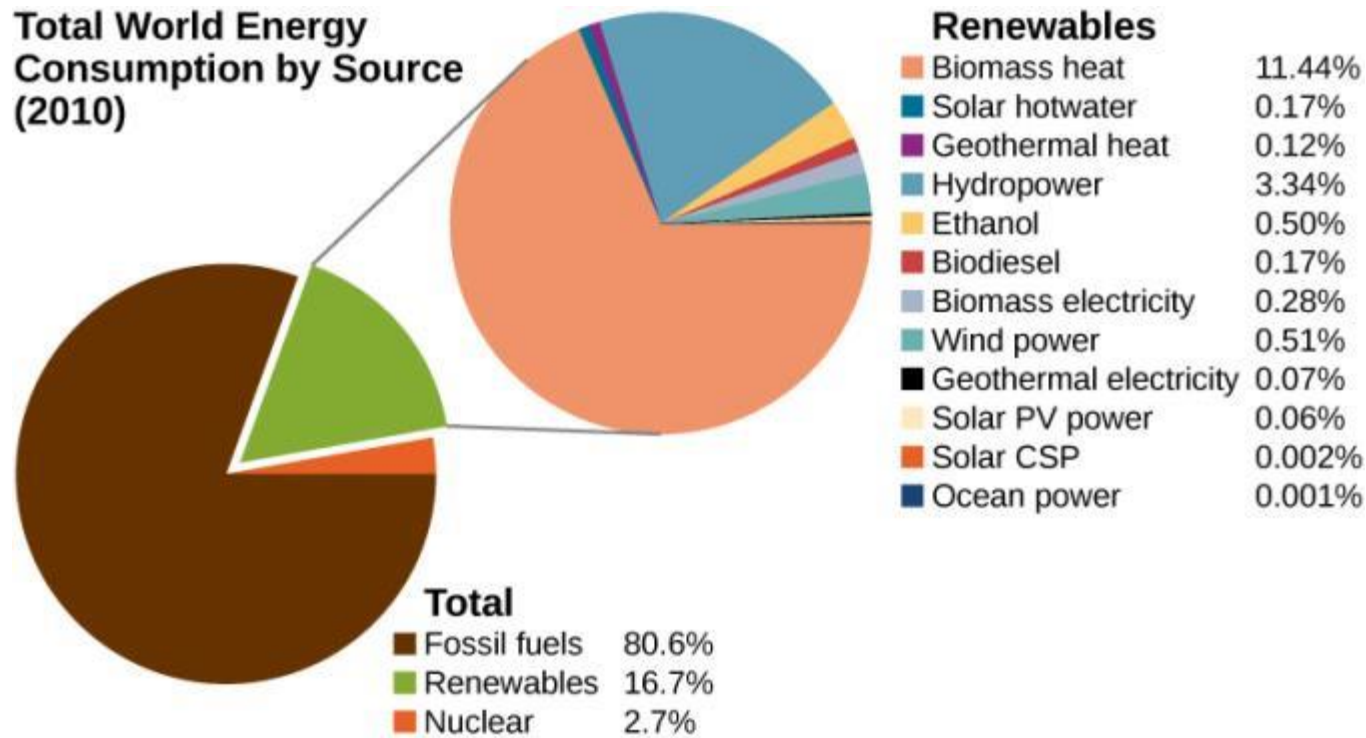
FIGURE 8.14



Energy that we use in society takes many forms, which be converted from one into another depending on the process involved. We will study many of these forms of energy in later chapters in this text. (credit "sun": EIT SOHO Consortium, ESA, NASA; credit "solar panels": "kjkolb"/Wikimedia Commons; credit "gas burner": Steven Depolo)

FIGURE 8.15

Total World Energy Consumption by Source (2010)



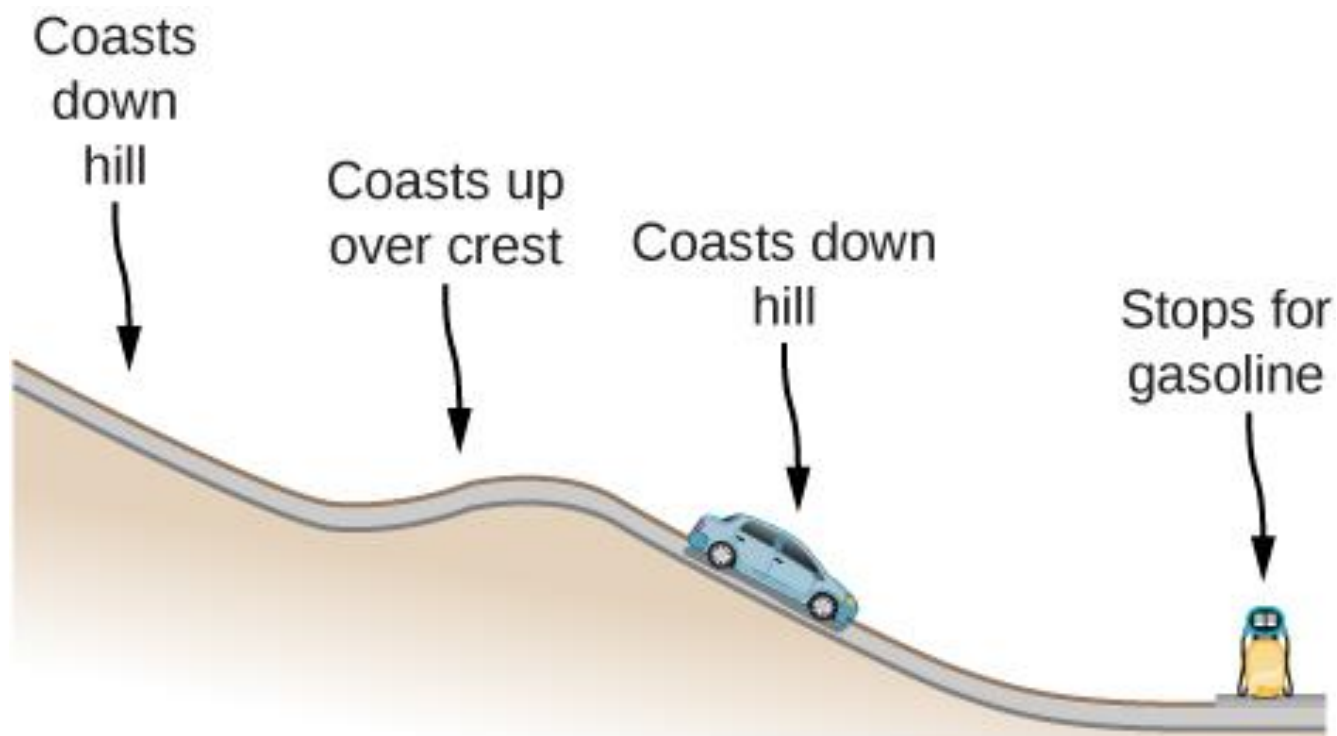
World energy consumption by source; the percentage of renewables is increasing, accounting for 19% in 2012.

FIGURE 8.16

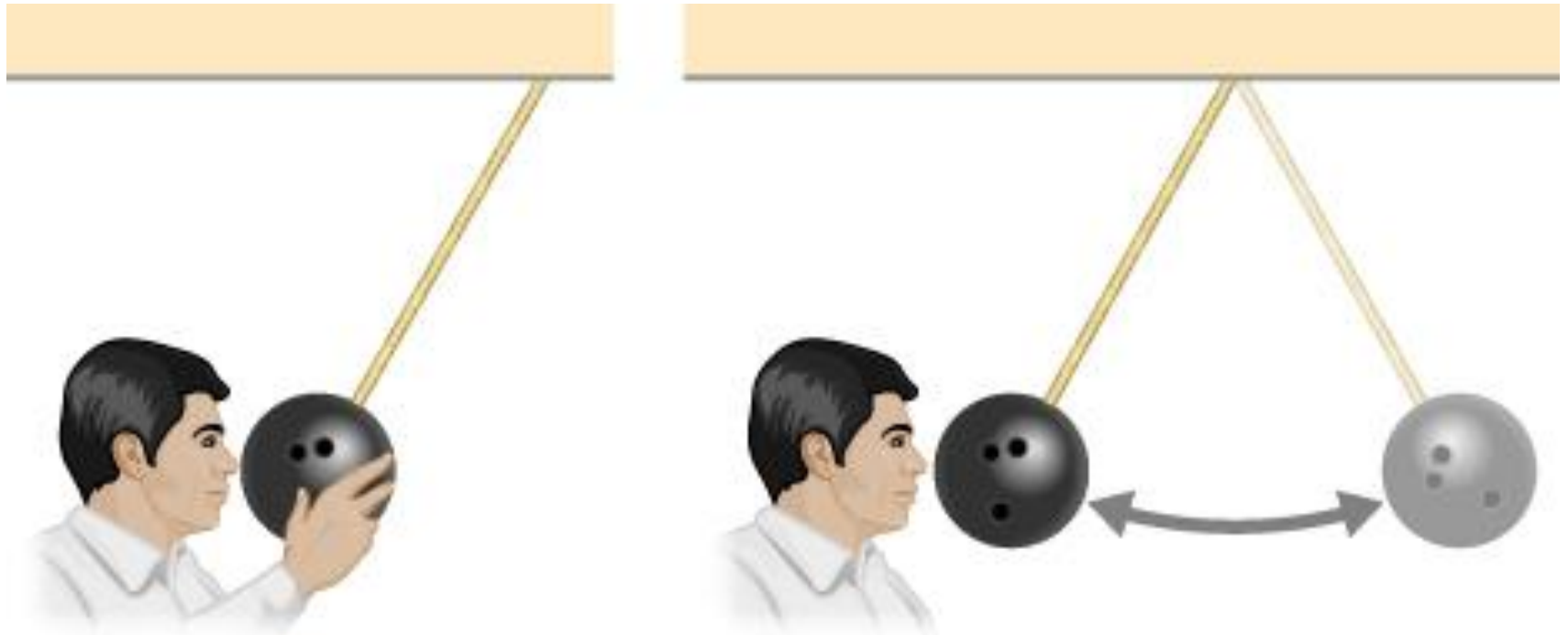


Solar cell arrays found in a sunny area converting the solar energy into stored electrical energy. (credit: Sarah Swenty)

EXERCISE 11



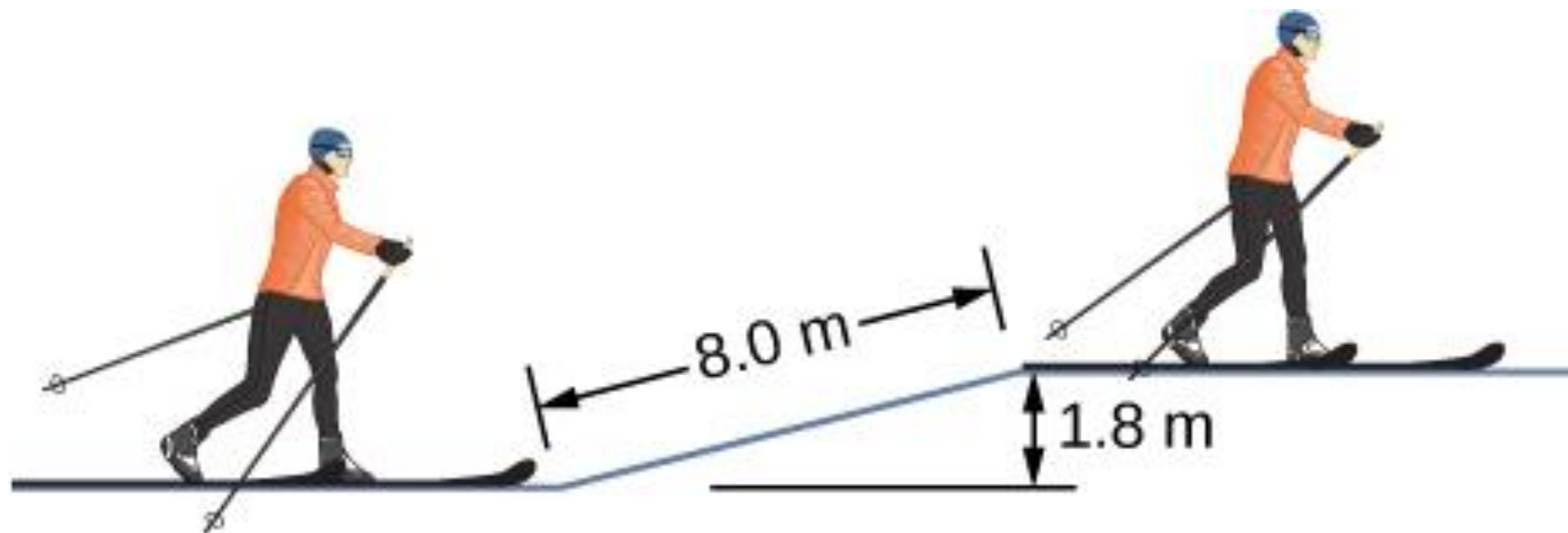
EXERCISE 14



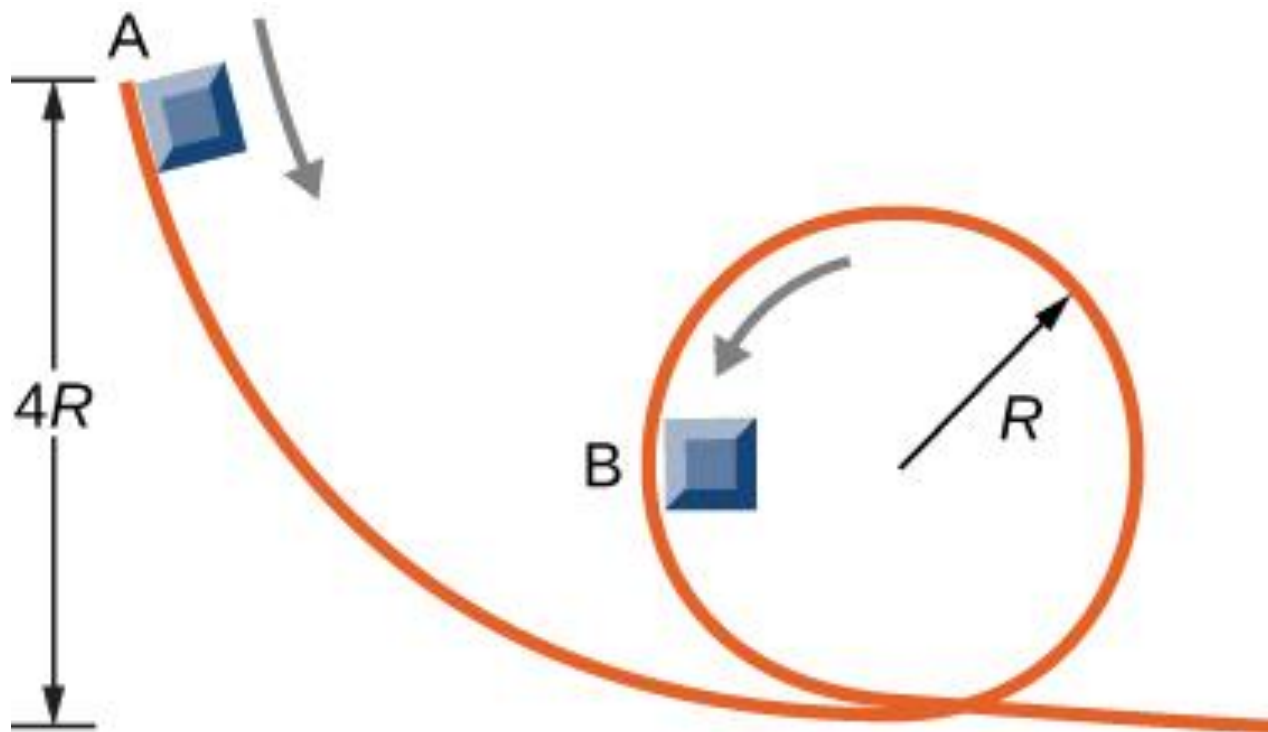
EXERCISE 30



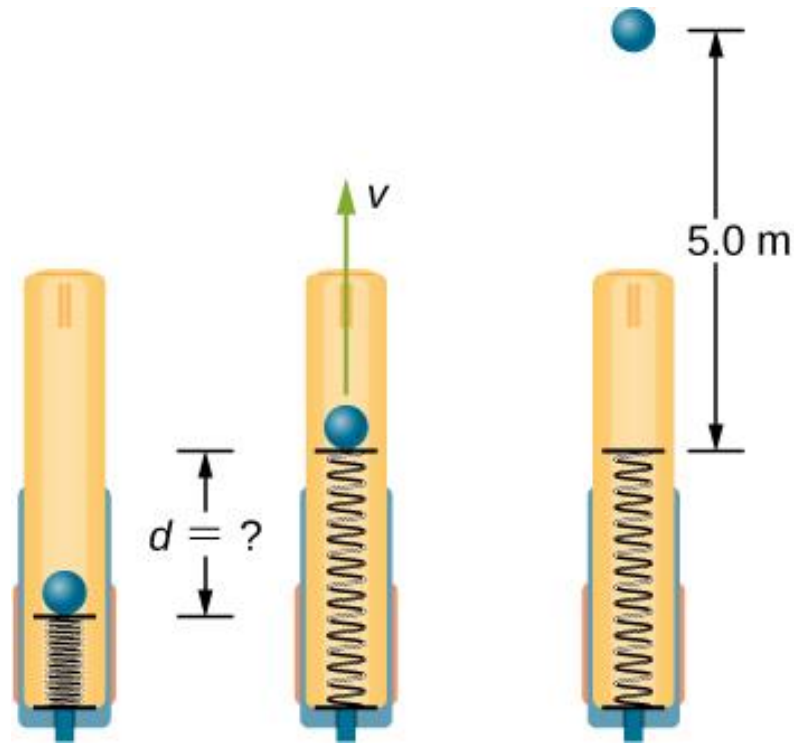
EXERCISE 38



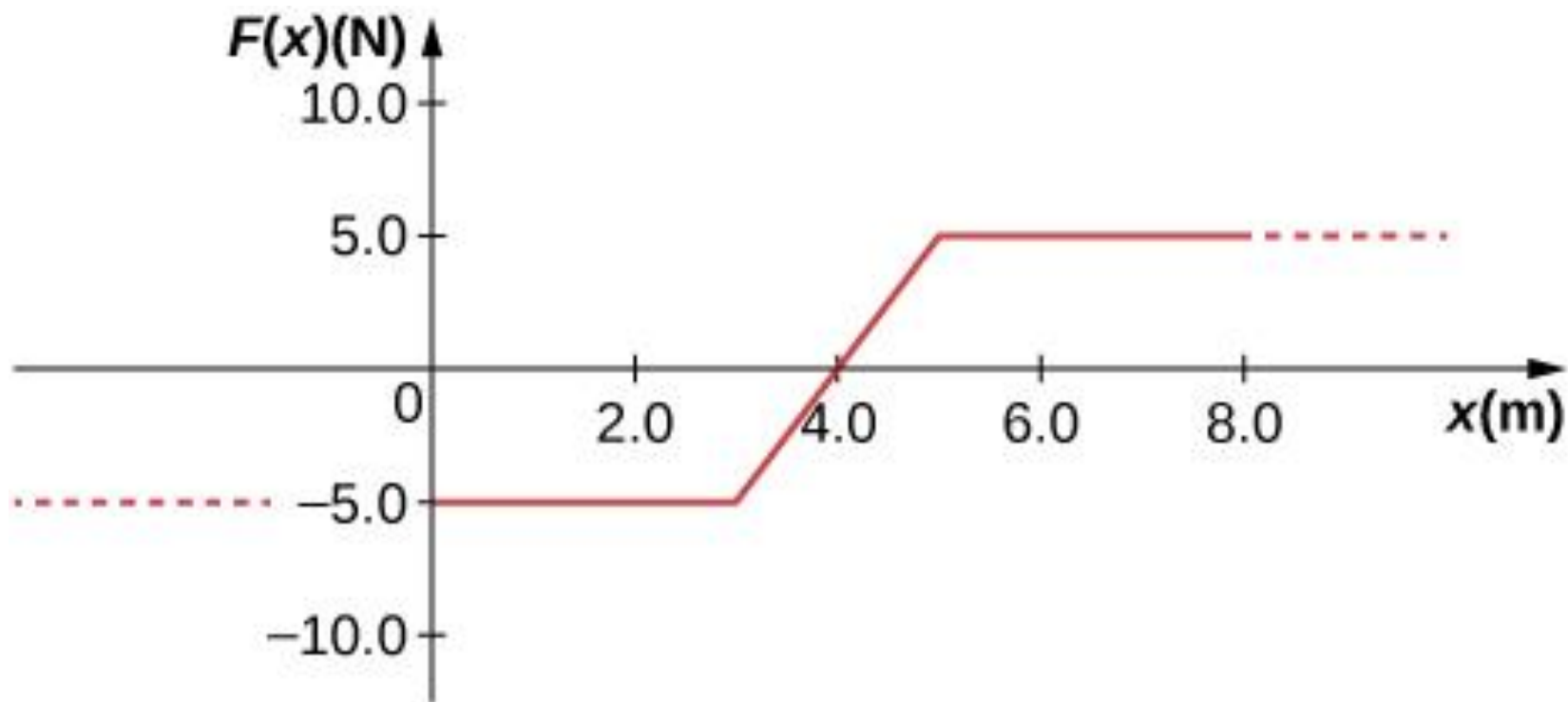
EXERCISE 42



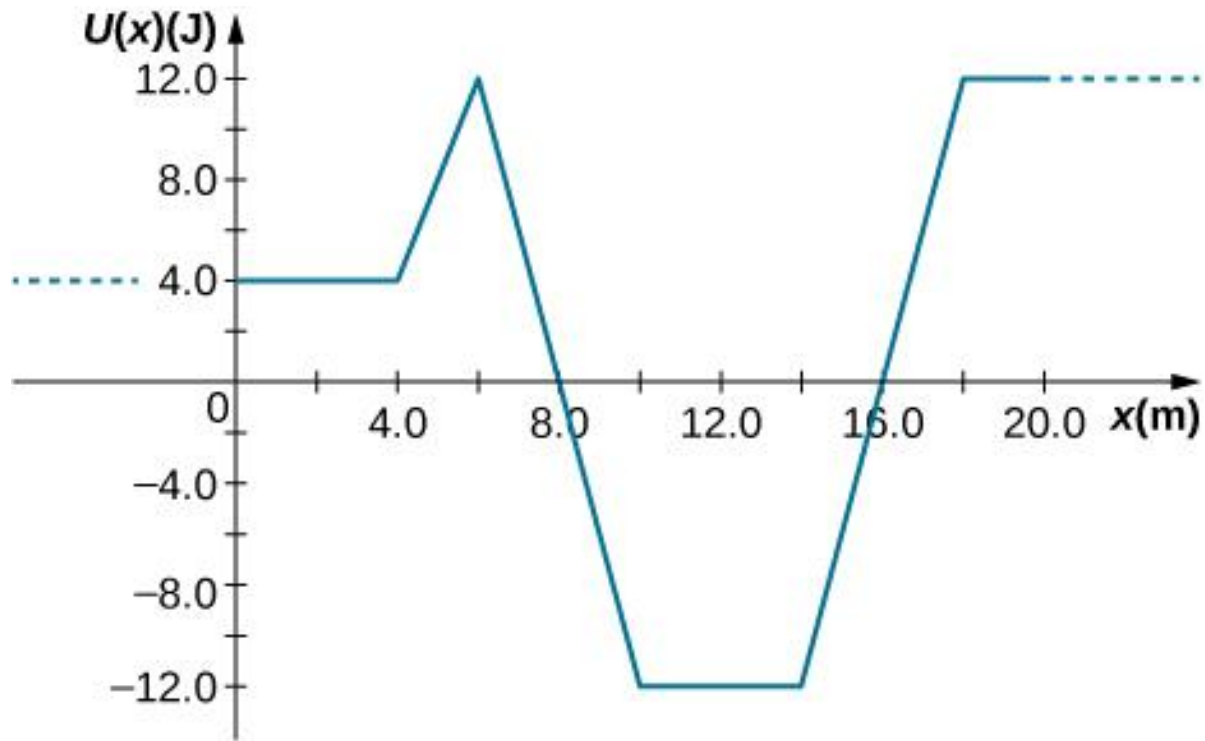
EXERCISE 43



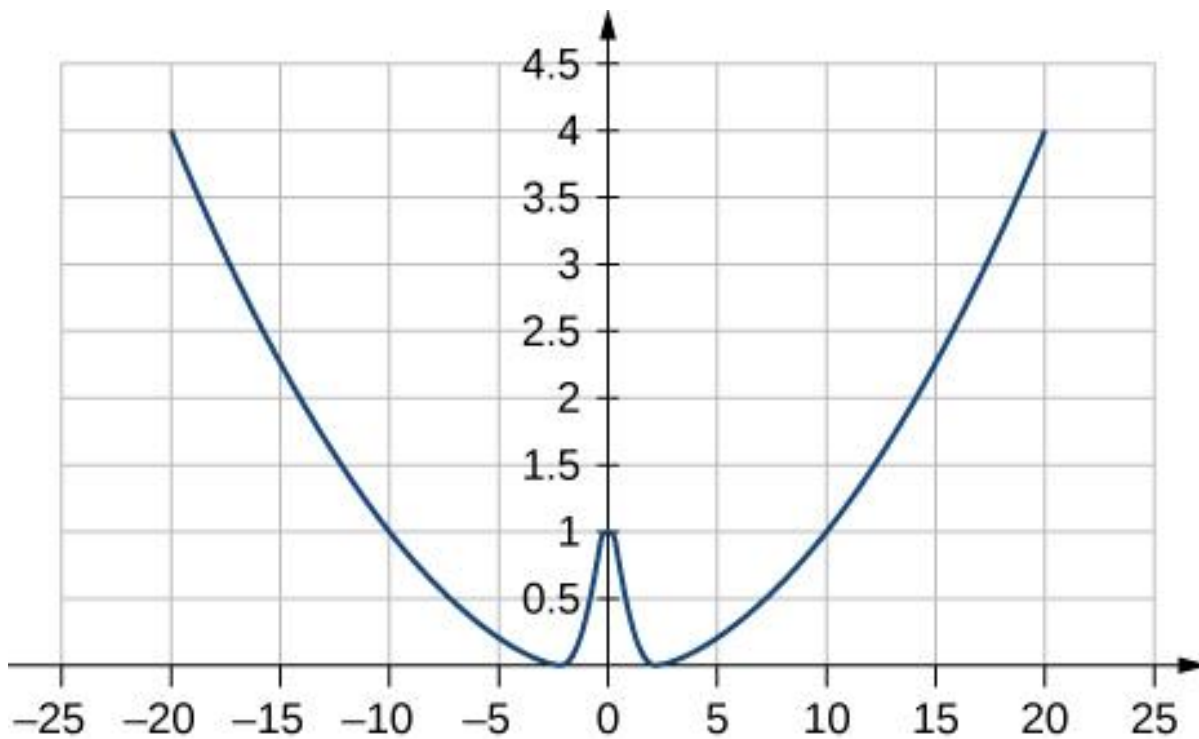
EXERCISE 49



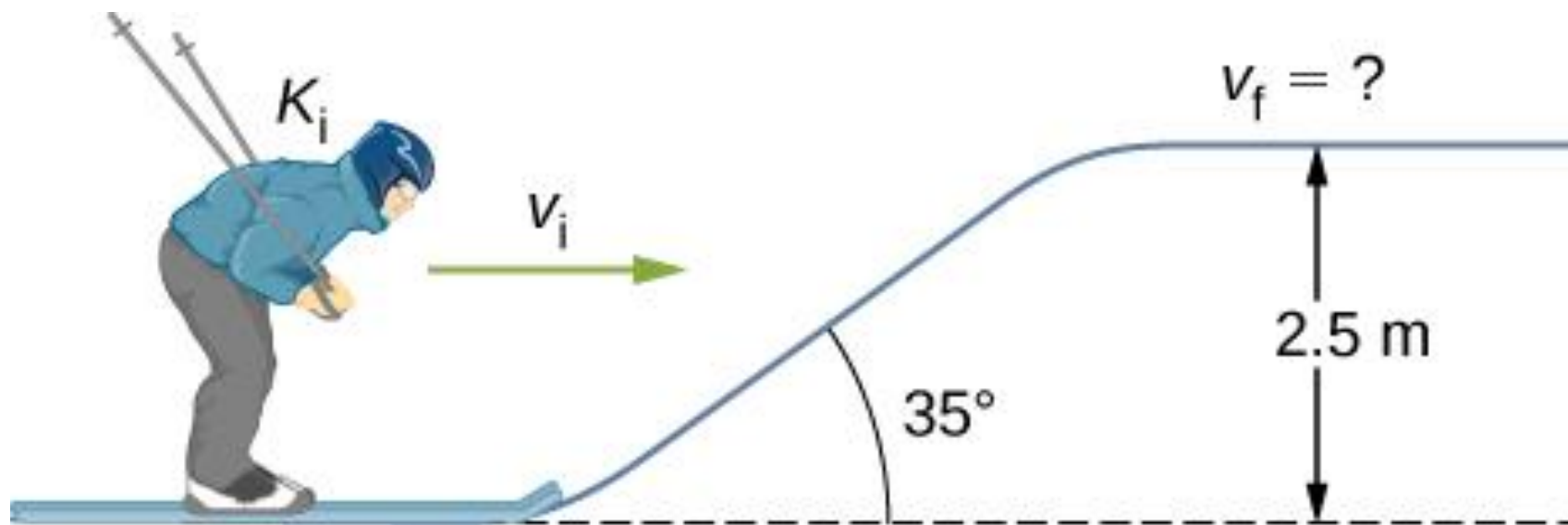
EXERCISE 50



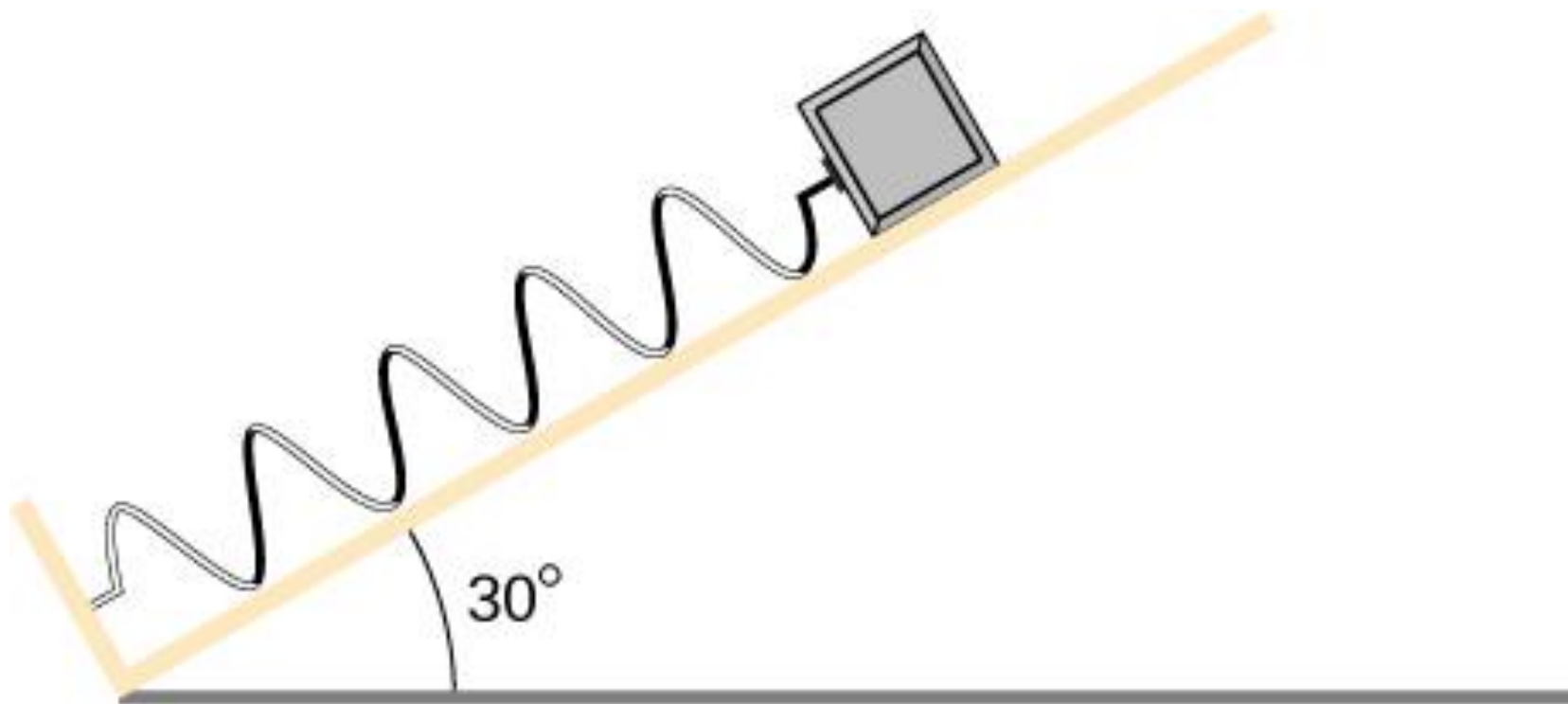
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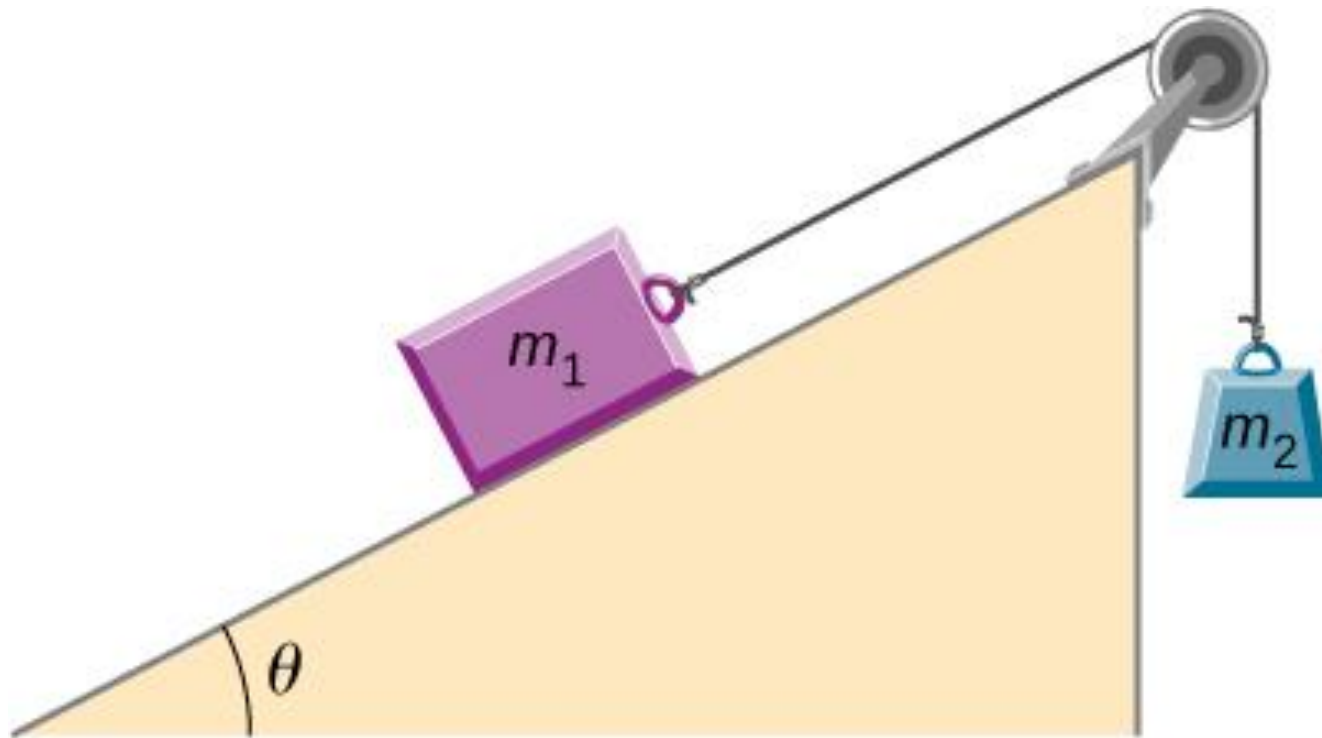
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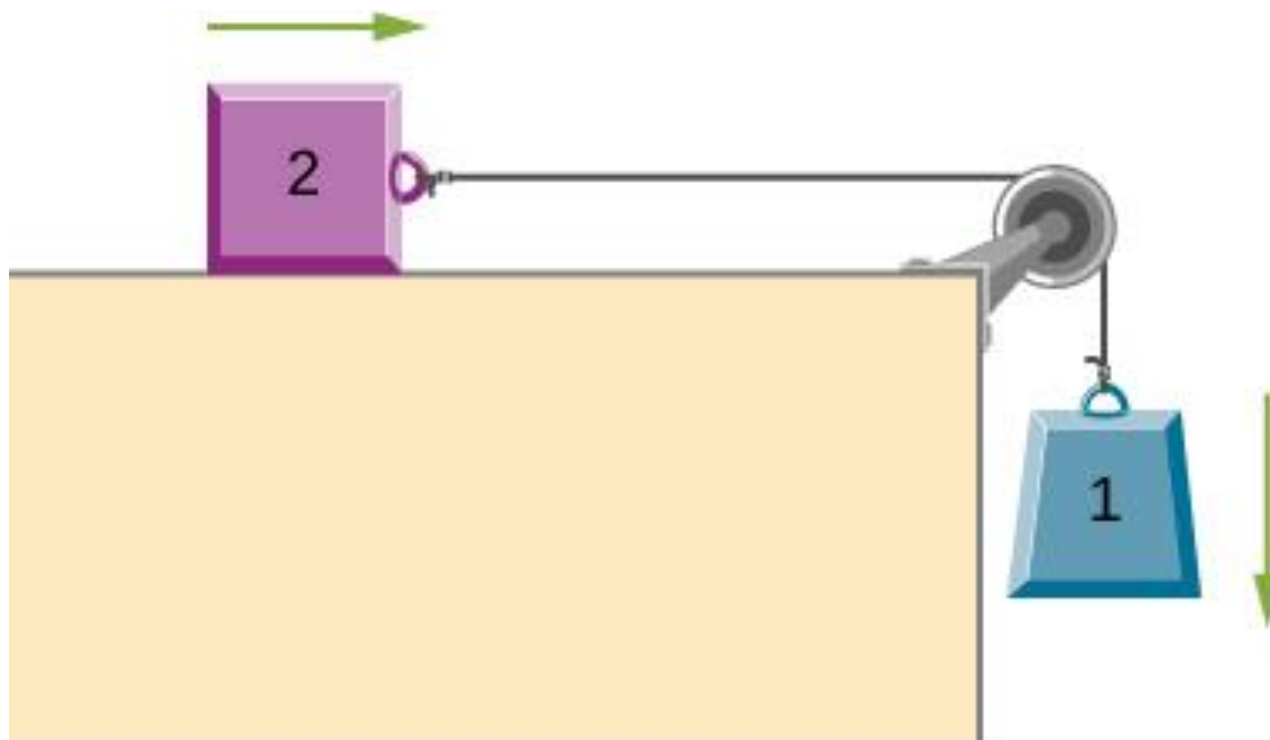
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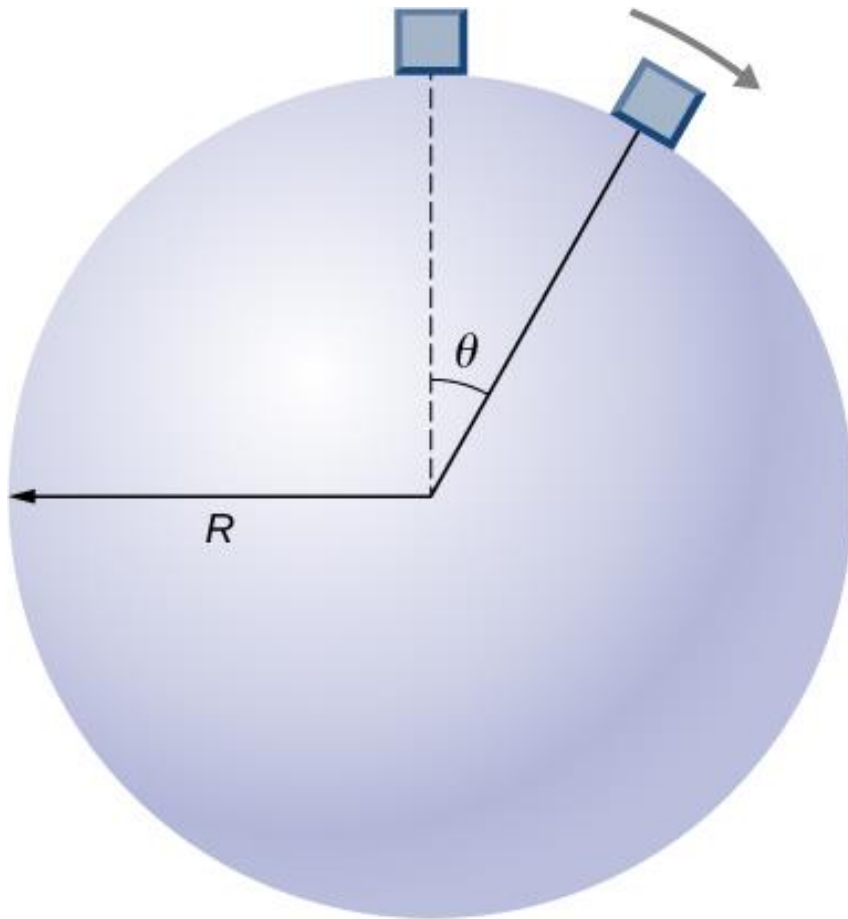
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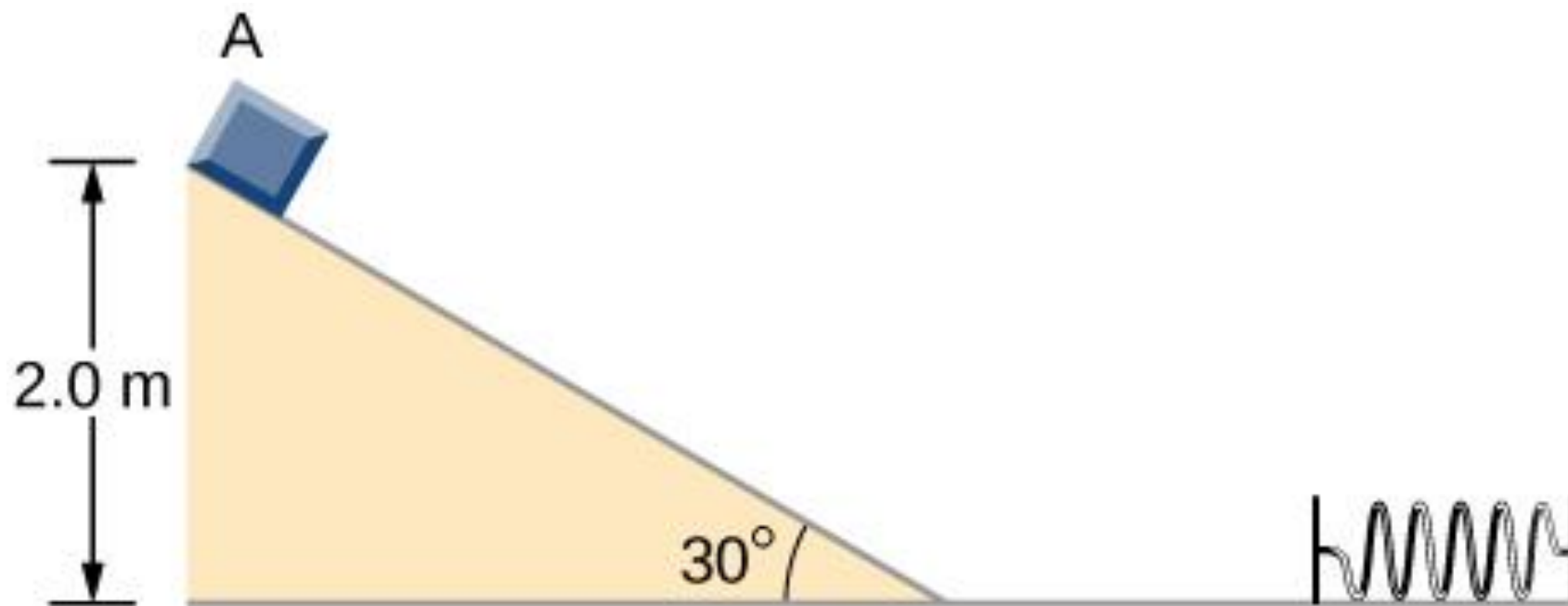
EXERCISE 71



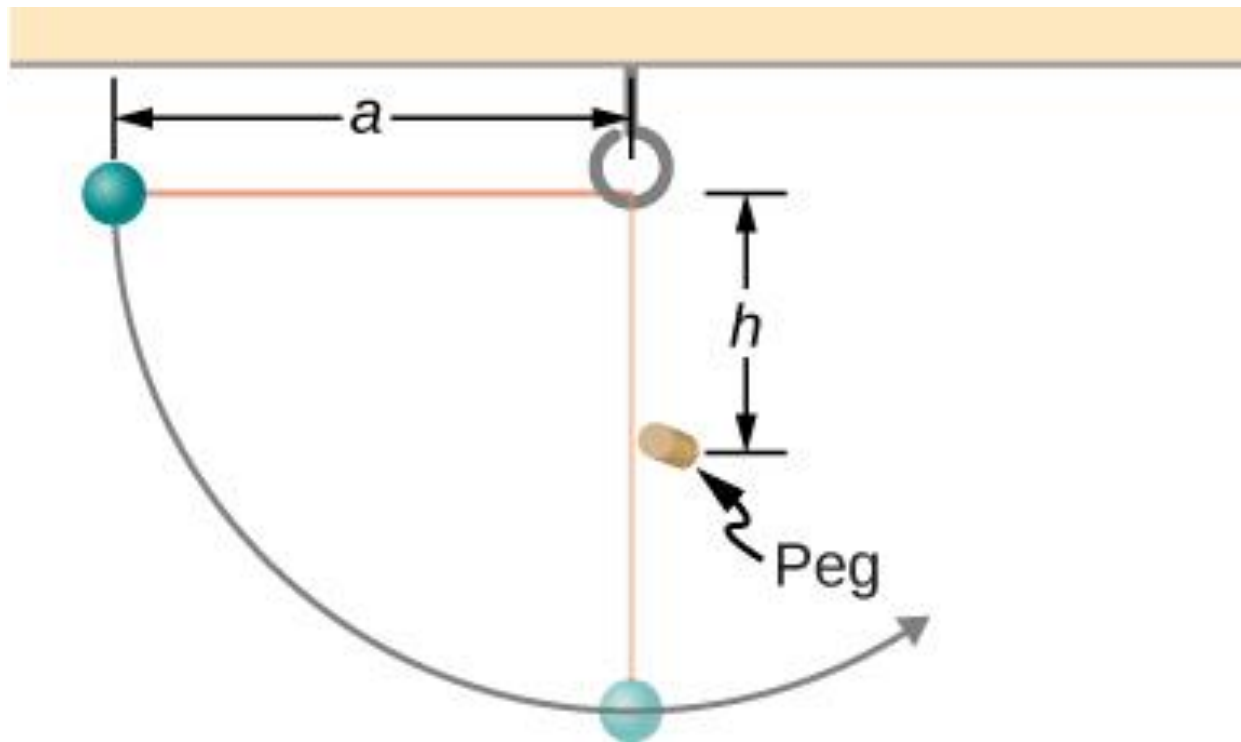
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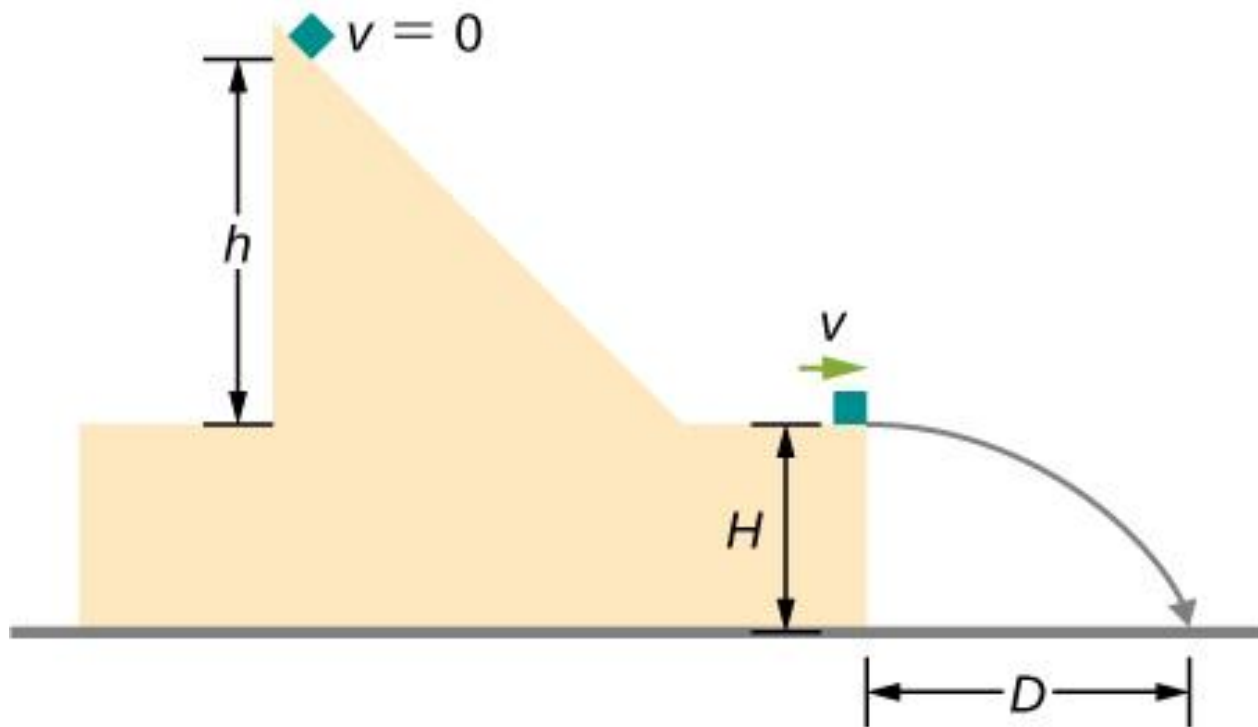
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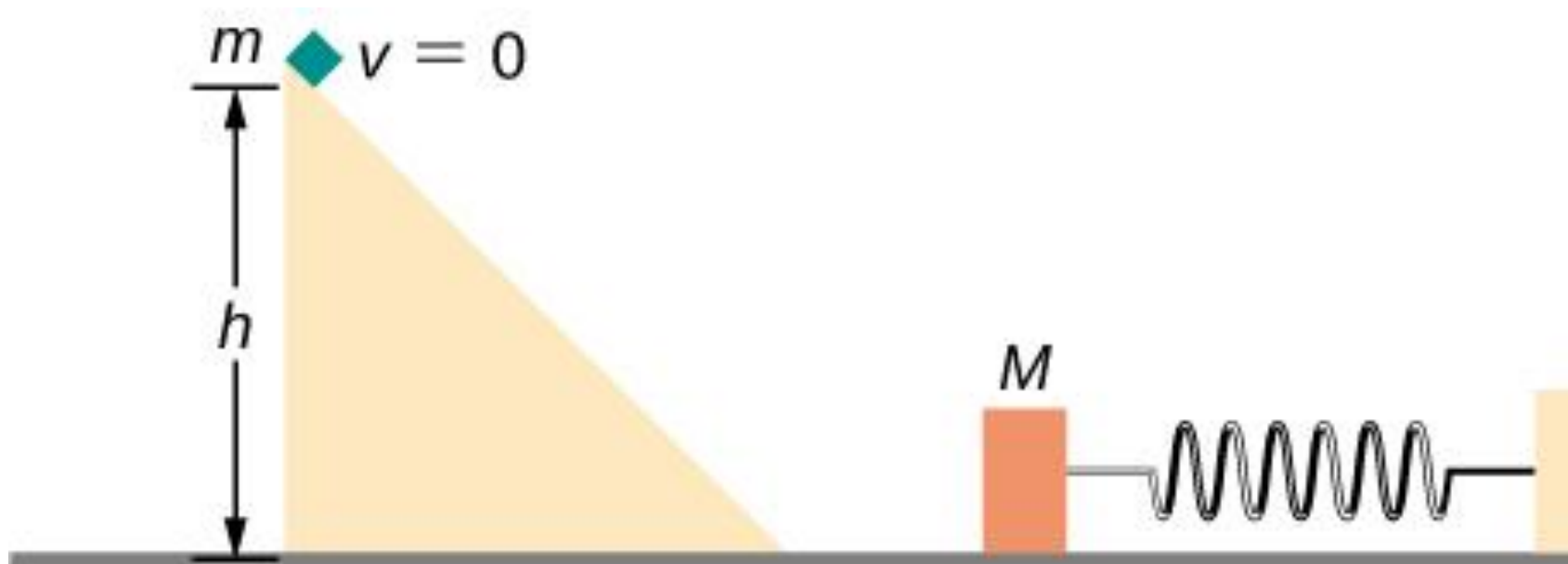
EXERCISE 75



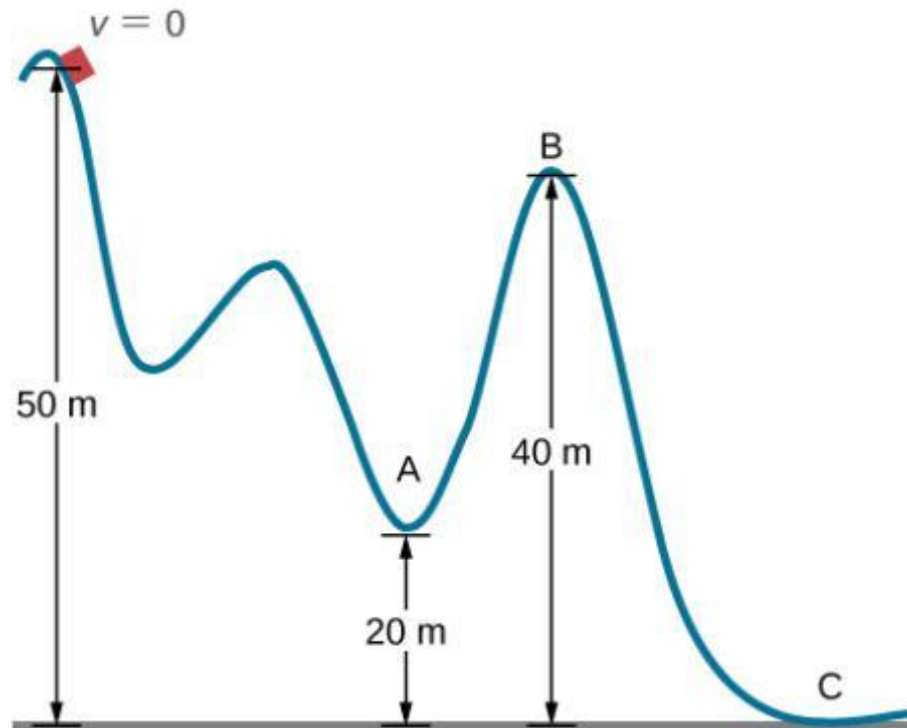
EXERCISE 76



EXERCISE 77



EXERCISE 83





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