

## Forces in Nature

18. What is the mass of an object if it has a weight of 80.0 N near the earth's surface?
19. What is the acceleration due to gravity near the surface of the moon if an object that has a mass of 22.0 kg has a weight of 36.0 N near the moon's surface?
20. What is the weight of a 72.0 kg object near the surface of the earth?
21. What is the mass of an object if it has a weight of 127 N near the earth's surface?

## Frictional Force

22. A 14.0 kg object is resting on a horizontal surface. What is the normal force acting on the object?
23. A 9.6 kg object is pulled along a horizontal surface. If the coefficient of friction between the surfaces is 0.11, what is the force of friction.
24. A 20.0 N object is placed on a horizontal surface. A force of 3.0 N is required to keep the object moving at constant speed. What is the coefficient of friction between the two surfaces?
25. A 16.2 kg object is at rest on an inclined plane. If the inclined plane makes an angle of  $25.0^\circ$  with the horizontal, what is the normal force acting on the object?
26. A 15.0 N object is pulled up an inclined plane. If the inclined plane makes an angle of  $35.0^\circ$  with the horizontal, and the coefficient of friction is 0.300, what is the force of friction?

## Applied Force

27. An 11.0 kg object is thrown vertically into the air with an applied force of 145 N. What is the initial acceleration of the object?
28. A 12.0 kg object is pushed with a horizontal force of 6.0 N east across a horizontal table. If the force of friction between the two surfaces is 2.0 N, what is the acceleration of the object?
29. A 15.0 kg object is thrown vertically into the air. If the initial acceleration of the object is  $8.80 \text{ m/s}^2$ , what is the applied force?
30. A 20.0 kg object is pulled horizontally along a level floor with an applied force of 27.0 N. If this object is accelerating at a rate of  $0.80 \text{ m/s}^2$ , what is the magnitude of the force of friction?
31. An object is pulled west along a horizontal frictionless surface with a steady horizontal force of 12.0 N. If the object accelerates from rest to a velocity of 4.0 m/s while moving 5.0 m, what is the mass of the object?
32. A 6.3 kg object is thrown upward with an acceleration of  $0.45 \text{ m/s}^2$ . What is the magnitude of the force applied to the object?
33. What is the tension in the cable on a  $1.20 \times 10^3 \text{ kg}$  elevator that is
  - a. accelerating downward at a rate of  $1.05 \text{ m/s}^2$ ?
  - b. accelerating upward at a rate of  $1.05 \text{ m/s}^2$ ?
  - c. moving downward at a constant velocity of 1.10 m/s?
34. An object that has a mass of 36.0 kg is pushed along a horizontal surface with a force of 85.0 N. If the force of friction is 72.0 N, what is the magnitude of the acceleration of the object?
35. A horizontal force of 90.0 N is required to push a 75.0 kg object along a horizontal surface at a constant speed. What is the magnitude of the force of friction?
36. A 1.0 kg object is given a push along a horizontal surface. If the velocity of the object when it is released is 0.50 m/s west, and the object slides 0.25 m before coming to a stop, what is the magnitude of the force of friction?