

Chapter 8 Density and Buoyancy**Standard Set 8. Density and Buoyancy**

All objects experience a buoyant force when immersed in a fluid.

As a basis for understanding this concept:

- 8. a.** *Students know* density is mass per unit volume.
- 8. b.** *Students know* how to calculate the density of substances (regular and irregular solids and liquids) from measurements of mass and volume.
- 8. c.** *Students know* the buoyant force on an object in a fluid is an upward force equal to the weight of the fluid the object has displaced.
- 8. d.** *Students know* how to predict whether an object will float or sink.

Overview

Container ships weighing tens of thousands of metric tons float in water, but a small rock always sinks to the bottom of a lake. Why is this so? Objects sink in water for the same reason that objects fall on land—gravity. You learned in Chapter 2 that **gravity** is the force that pulls objects together. Because Earth is so massive, objects on Earth are attracted to it and fall to the ground. On Earth, gravity is a downward force that acts on all objects, no matter if they are solid, liquid, or gas.

Gravity pulls the rock down to the bottom of the lake, but the container ship stays afloat. The container ship is experiencing the downward pull of gravity, but another force is pushing up on the ship, in the direction opposite to the downward force of gravity. This force, called the **buoyant force**, is an upward force exerted by water and other fluids on a submerged object. As long as the buoyant force is greater than or equal to the force of gravity acting on the object, the object will float.

Buoyancy, or the ability to float, depends on the physical properties of both the object and the fluid in which it is submerged. Buoyancy also depends on the shape of the object. Shape is one of the key reasons why the container ship floats and the rock sinks.