

KEY IDEAS

Section 1 Fluids and Buoyant Force

- Force is a vector quantity that causes changes in motion.
- A fluid is a material that can flow, and thus it has no definite shape. Both gases and liquids are fluids.
- Buoyant force is an upward force exerted by a fluid on an object floating on or submerged in the fluid.
- The magnitude of a buoyant force for a submerged object is determined by Archimedes' principle and is equal to the weight of the displaced fluid.
- The magnitude of a buoyant force for a floating object is equal to the weight of the object because the object is in equilibrium.

Section 2 Fluid Pressure

- Pressure is a measure of how much force is exerted over a given area.
- According to Pascal's principle, pressure applied to a fluid in a closed container is transmitted equally to every point of the fluid and to the walls of the container.
- The pressure in a fluid increases with depth.

Section 3 Fluids in Motion

- Moving fluids can exhibit laminar (smooth) flow or turbulent flow.
- An ideal fluid is incompressible, nonviscous, and, when undergoing ideal flow, nonturbulent.
- The continuity equation is derived from the fact that the amount of fluid leaving a pipe during some time interval equals the amount entering the pipe during that same time interval.
- According to Bernoulli's principle, swift-moving fluids exert less pressure than slower-moving fluids.

KEY TERMS

fluid (p. 274)

mass density (p. 275)

buoyant force (p. 275)

pressure (p. 280)

ideal fluid (p. 284)

PROBLEM SOLVING

See **Appendix D: Equations** for a summary of the equations introduced in this chapter. If you need more problem-solving practice, see **Appendix I: Additional Problems**.

Variable Symbols

Quantities	Units	Conversions
ρ density	kg/m ³ kilogram per meter ³	$= 10^{-3} \text{ g/cm}^3$
P pressure	Pa pascal	$= \text{N/m}^2$ $= 10^{-5} \text{ atm}$