

## Chapter 13 Forces in Fluids

**Section 13.3 Buoyancy**

(pages 400–404)

*This section discusses buoyancy and Archimedes' principle of factors that determine whether an object will sink or float in a fluid.*

**Reading Strategy** (page 400)

**Summarizing** As you read about buoyancy, write a brief summary of the text following each green heading. Your summary should include only the most important information. For more information on this Reading Strategy, see the **Reading and Study Skills** in the **Skills and Reference Handbook** at the end of your textbook.

<b>Buoyant Force</b>	Buoyant force is the apparent loss of weight of an object submerged in a fluid.

**Buoyant Force** (page 400)

1. What is buoyancy? \_\_\_\_\_
2. Circle the letter of the correct answer. In which direction does a buoyant force act?
  - a. in the direction of gravity
  - b. perpendicular to gravity
  - c. in the direction opposite of gravity
  - d. from above the fluid
3. Is the following sentence true or false? The greater a fluid's density, the greater its buoyant force. \_\_\_\_\_
4. Buoyancy causes an apparent \_\_\_\_\_ of weight of an object immersed in a fluid.
5. Circle the letter of each sentence that is true about buoyancy.
  - a. Forces pushing up on a submerged object are greater than the forces pushing down on it.
  - b. Forces acting on the sides of a submerged object cancel each other out.
  - c. Gravitational forces work together with buoyant forces.
  - d. The net buoyant force is non-vertical.

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**Archimedes' Principle** (page 401)

6. According to Archimedes' principle, the weight of fluid displaced by a floating object is equal to the \_\_\_\_\_ acting on that object.
7. Is the following sentence true or false? When an object floats partially submerged in a fluid, it displaces a volume of fluid equal to its own volume. \_\_\_\_\_

**Density and Buoyancy** (pages 401–404)

Match each description with the correct property. Properties may be used more than once.

- | Description  | Property         |
|--|------------------|
| _____ 8. This property is the ratio of an object's mass to its volume, often expressed in $\text{g}/\text{cm}^3$ . | a. weight        |
| _____ 9. This force is equal to the force of gravity that acts on a floating object.                               | b. buoyant force |
| _____ 10. When this property is greater for an object than for the fluid it is in, the object sinks.               | c. density       |
| _____ 11. These two forces act on every object in a fluid.   |                  |
| _____ 12. An object will either float or be suspended when the buoyant force is equal to this.                     |                  |
13. Use what you know about density and buoyancy to predict whether each of the substances listed in the table will float or sink in water. The density of water is  $1.0 \text{ g}/\text{cm}^3$ .

Will It Float or Sink?		
Substance	Density ( $\text{g}/\text{cm}^3$ )	Float or Sink?
Gold	19.3	
Balsa Wood	0.15	
Ice	0.92	
Brick	1.84	
Milk	1.03	
Gasoline	0.70	

14. How is a heavy steel ship able to float?
- Because the density of steel is  $7.8 \text{ g}/\text{cm}^3$ .
  - The ship's shape enables it to displace a large volume of water.
  - Because the density of water is  $1 \text{ g}/\text{cm}^3$ .
  - The ship's effective density is greater than that of water.