



## 10.4 Buoyancy

**READ**


When an object is placed in a fluid (liquid or gas), the fluid exerts an *upward force* upon the object. This force is called a **buoyant force**.

At the same time, there is an attractive force between the object and Earth—the force of gravity. It acts as a *downward force*. You can compare the two forces to determine whether the object floats or sinks in the fluid.

Buoyant force > Gravitational force	Buoyant force < Gravitational force
Object floats	Object sinks

### EXAMPLES

**Example 1:** A 13-N object is placed in a container of fluid. If the fluid exerts a 60-N buoyant (upward) force on the object, will the object float or sink?

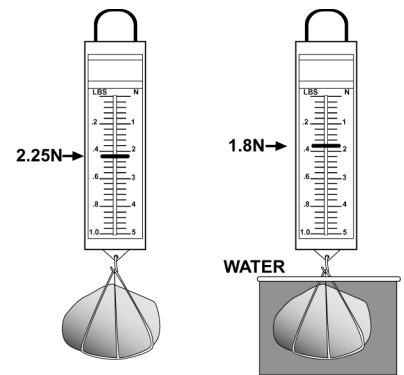
**Answer:** Float. The upward buoyant force (60 N) is greater than the weight of the object (13 N).

**Example 2:** The rock weighs 2.25 N when suspended in air. In water, it appears to weigh only 1.8 N. Why?

**Answer:** The water exerts a buoyant force on the rock. This buoyant force equals the difference between the rock's weight in air and its apparent weight in water.

$$2.25 \text{ N} - 1.8 \text{ N} = 0.45 \text{ N}$$

The water exerts a buoyant force of 0.45 newtons on the rock.



### PRACTICE

1. A 4.5-N object is placed in a tank of water. If the water exerts a force of 4.0 N on the object, will the object sink or float?
2. The same 4.5-N object is placed in a tank of glycerin. If the glycerin exerts a force of 5.0 N on the object, will the object sink or float?
3. You suspend a brass ring from a spring scale. Its weight is 0.83 N while it is suspended in air. Next, you immerse the ring in a container of light corn syrup. The ring appears to weigh 0.71 N. What is the buoyant force acting on the ring in the light corn syrup?
4. You wash the brass ring (from question 3) and then suspend it in a container of vegetable oil. The ring appears to weigh 0.73 N. What is the buoyant force acting on the ring?
5. Which has greater buoyant force, light corn syrup or the vegetable oil? Why do you think this is so?
6. A cube of gold weighs 1.89 N when suspended in air from a spring scale. When suspended in molasses, it appears to weigh 1.76 N. What is the buoyant force acting on the cube?
7. Do you think the buoyant force would be greater or smaller if the gold cube were suspended in water? Explain your answer.