

Buoyancy Simulator

Classroom worksheet · Interactive simulation: <https://lkforge.com/tools/physics/buoyancy/>

Name: _____ Date: _____

Learning objectives

- State and apply Archimedes' principle.
- Relate floating and sinking to density.
- Explain the buoyant force on submerged and floating objects.

Variables to change

- Object density
- Object volume
- Fluid density

Procedure

1. Place an object less dense than the fluid and observe it float.
2. Increase the object's density past the fluid's and observe it sink.
3. Change the fluid density and see how the floating level changes.

Observations

Record whether each object floats or sinks and how much of a floating object sits below the surface.

Questions

1. State Archimedes' principle.
2. What determines whether an object floats or sinks?

3. For a floating object, how does buoyant force compare to weight?
4. Why does a steel ship float though steel is denser than water?
5. What fraction of an iceberg floats above water ($\rho_{\text{ice}} \approx 0.92$, $\rho_{\text{water}} \approx 1.0$)?

Answer key (instructors)

- **1.** The buoyant force equals the weight of the fluid displaced by the object.
- **2.** Its density relative to the fluid: less dense floats, more dense sinks.
- **3.** They are equal — the object is in equilibrium.
- **4.** Its hull shape displaces a large volume of water, so average density (including air) is less than water's.
- **5.** About 8% above; roughly 92% is submerged.

Buoyant force equals the weight of displaced fluid (Archimedes' principle). An object floats when it is less dense than the fluid and sinks when denser; a floating object displaces exactly its own weight of fluid.