# Immiscible Liquid Layers

*Find where an object floats in oil and water*

Name _____ Period _____ Date _____

Use density and buoyancy to explain why an object can float at the boundary between two liquids.

About 25 to 30 minutes | buildphysics.com/?experiment=fluid-layers

## Predict where the specimen will go

1. Keep Oil density at 800 kg/m³ and Water density at 1000 kg/m³. The specimen's volume is 0.080 m³.

2. Calculate specimen density using ρ = m/V. For each mass below, predict whether it will float at the oil surface, float across the oil–water boundary, or sink through both liquids.

| Mass (kg) | Calculated density (kg/m³) | Predicted location | Observed location |
|---|---|---|---|
| 48 | | | |
| 72 | | | |
| 88 | | | |

## Test the three masses

3. Select Interface specimen and open Fluid properties. For 48 kg and 72 kg, set Specimen mass in Explore this setup, then click Set floating position. Observe where it floats.

4. Set Specimen mass to 88 kg. Click Play and watch its motion. Pause after about 2 seconds. Record its motion in the table.

5. How does comparing the specimen's density with both liquid densities explain the three results?

6. Why is oil above water in this tank?

## Explain floating at the boundary

7. While paused, return Specimen mass to 72 kg and click Set floating position. Read Buoyant force and Submerged fraction in Fluid properties.

Record the buoyant force and submerged fraction. Calculate the specimen's weight using $W = mg$ and $g = 9.8\ m/s^2$. Compare the two forces.

8. The specimen is fully below the top liquid surface. Why can it remain at rest rather than sink to the bottom?

## Change the oil density

9. Keep the specimen at 72 kg and the water at 1000 $kg/m^3$. Predict whether more or less of the specimen will lie in the water if oil density decreases to 700 $kg/m^3$.

10. Set Oil density to 700 $kg/m^3$ and click Set floating position. Sketch the specimen and the oil–water boundary before and after the change.

11. Explain the change in position using the buoyant forces from the two liquids.