

Buoyancy Practice Problems

Physics

Name:

Period:

1. How is the buoyant force created on an object immersed in a fluid?
2. What is the difference between sinking, floating and rising?
3. Why does the buoyant force always lift upward on an object?
4. Why is it inaccurate to say that light objects float and heavy objects sink?
5. Why does a beach ball pushed under the surface of the water rise to the surface and then end up floating on the surface? Explain in terms of buoyant force and Archimedes's principle.
6. Cargo ships traveling across the oceans have to be careful about how heavily loaded they are when they sail up a river to get to an inland port. Using the concepts of buoyancy, explain why sailing from the ocean into a river is potentially dangerous for the ship.
7. As they dive deep beneath the surface of the ocean, an elephant seal will allow its lungs to collapse. How does this make it easier for the elephant seal to dive (sink) deep into the ocean?
8. I take an empty cargo ship floating at the dock and then proceed to load it full of Styrofoam. What happens to the ship when it is full of Styrofoam? Does it rise higher in the water, keep floating at the same level or sink deeper into the water? Explain.

9. A 10 cm cube of rock weighs 22.5 N.

a) It is submerged in a bath of freon-11. How much buoyant force does it feel? Will it sink, float or rise?

b) It is submerged in a bath of bromine. How much buoyant force does it feel? Will it sink, float or rise?

11. During manufacturing a 0.05 m x 1 m x 1 m aluminum panel is cleaned in a bath of isopropyl alcohol. The panel weighs 1367 N. How heavy will the panel feel when is it submerged in the alcohol?

12. a) How much buoyant force is there acting on a 10,000 N raft floating on the surface of the ocean?

b) If the raft is 3 m long and 5 m wide, how deep into the ocean will it float?

13. a) A rectangular raft, 2 m long and 3 m wide, *floats* 10 cm deep in a freshwater lake when it is unloaded. How heavy is the raft?

b) If 3 people – 80 kg, 60 kg and 30 kg – get on the raft, how deep in the water will it float to support their weight (as well as its own)?