

PHYS 1401 General Physics I
Homework #5

For the first three questions, express your final answer in the form of a *complete sentence*, with the correct units and number of significant figures. Do not just circle a number. Show all calculations, and draw diagrams where appropriate. The last six questions are found on the [Mastering Physics](#) site, and are worth a point each.

It would be a good idea to try the Tutorials before tackling the homework problems. If you complete the entire Tutorial for Homework #5, you will get 1 bonus point. If you complete any part of the Tutorial, you will get half a bonus point.

AN IMPORTANT NOTE: Problems involving the buoyant force are Newton's Second Law problems, and should be solved with the same process!

Do these problems on paper and turn them in

1. (1 point) An iceberg is floating motionless in seawater. What percentage of the iceberg's volume is hidden under the water? Remember that the formula for the buoyant force includes volume, but only the volume actually under the water!
2. (1.5 points) Many of the cities in Holland are below sea level, and the sea is held back by a series of levies, called dikes. A story tells of a young Dutch boy named Hans Brinker, who was walking home along the dikes from school one day, and saw a small leak. He realized this was a real problem, so he stuck his thumb in the hole and cried for help.
 - a. Imagine that the hole is 10.0 feet (3.08 meters) beneath the level of the sea beyond. How much pressure is being exerted at the hole?
 - b. Hans' thumb has a surface area of 0.895 square centimeters (Think: How many square centimeters in a square meter?). How much force does he feel on his thumb? Do you think that is a reasonable amount of force for a child to balance?
 - c. Normally, to find the total pressure exerted, we'd have to add atmospheric pressure to the pressure exerted by the seawater. Why do we not have to worry about that here?
3. (1.5 points) Indiana Jones has acquired an artifact called the Amulet of Set, a piece of platinum jewelry in the shape of a snake. However, he suspects that he has a fake amulet, a replica planted by one of his enemies. He does not want to risk destroying the amulet in a chemical analysis, so he tries a more ancient method of identification. He first determines the mass of the amulet as it just hangs from a scale to be 1.28 kg. When he completely immerses the amulet in pure water, the reading on the scale drops to 1.12 kg.

- a. Draw a diagram showing the forces acting on the amulet as it is immersed.
- b. What is the buoyant force felt by the amulet?
- c. What is the volume of the amulet? Do not assume it is actually made of platinum!
- d. Is the amulet authentic? Justify your answer.

These are the problems from the book that are online. The data are different, so you can work them out without numbers and then go online.

1. Chapter 13, Problem 2, page 424
2. Chapter 13, Problem 13, page 424
3. Chapter 13, problem 28, page 425
4. Chapter 13, Problem 30, page 425
5. Chapter 13, problem 32, page 425
6. Chapter 13, Problem 35, page 425