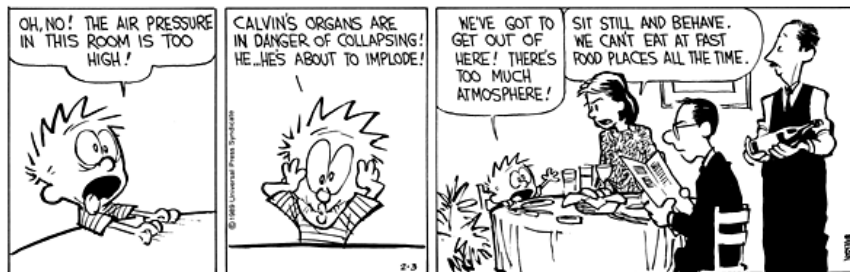


October 24, 2011

Physics 131

Prof. E. F. Redish

■ Theme Music: ZZ Top***Got Me Under Pressure*****■ Cartoon: Bill Watterson*****Calvin & Hobbes***

10/24/11

Physics 131

1

Outline

- Quiz 6
- Fluids: Statics
 - Pressure
 - Archimedes' principle
- Examples

10/24/11

Physics 131

2

Kinds of Matter

- Classify objects by how they deform.
 - *Solid*: don't change shape if you leave them alone or push on them (not too hard!)
 - *Gel*: look solid if you don't touch them but are "squishy" and change shape easily (jello, butter, clay,...)
 - *Liquid*: Have no shape of their own. Flow to fill a container but have constant volume.
 - *Gas*: Have neither shape nor volume but fill any container.
 - LOTS MORE!

10/24/11

Physics 131

3

Foothold ideas: Pressure



- A constrained fluid has an internal pressure
 - like an internal force at every point in all directions. (Pressure has no direction.)
- At a boundary or wall, the pressure creates a force perpendicular to the wall. $\vec{F} = p\vec{A}$
- The pressure in a fluid increases with depth. (Why?)

$$p = p_0 + \rho g d$$
- When immersed in a fluid, an object feels an (upward) BF equal to the weight of the displaced fluid. (Archimedes' Principle)

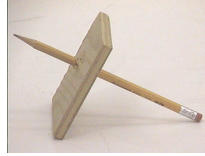
11/29/10

Physics 121

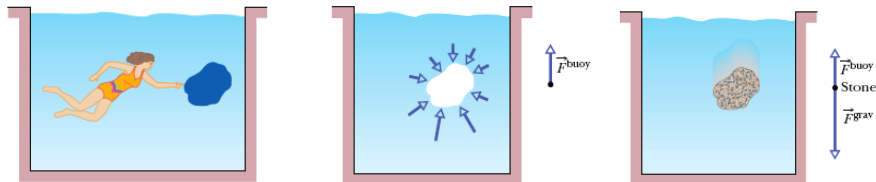
4

Reading questions

■ Area as a vector



■ Making sense of Archimedes' principle



10/24/11

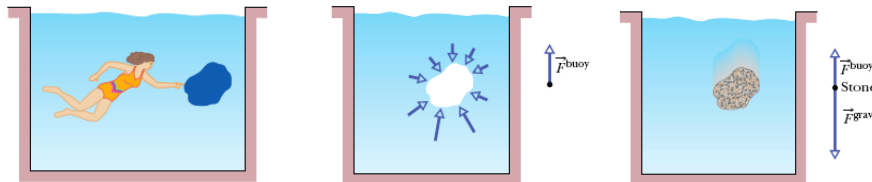
Physics 131

5

Making sense of AP



■ Consider the forces on a bag of water the same shape as an immersed object.



■ The BF is equal to the weight of the water displaced – that's what the surrounding water can hold up!

10/24/11

Physics 131

6