L 13 Fluids - 2 Fluid Statics: fluids at rest

- · More on fluids at rest
- · How is atmospheric pressure measured?
- Buoyancy: How can a steel boat float?

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Archimedes principle

- The buoyant force on an object in a fluid equals the weight of the fluid which it displaces.
- Anything less dense than water will float in water
- water weighs 10 N/liter→ each liter of displaced water provides 10 N of buoyant force

-this works for objects in water

-helium balloons (density of He = 0.18 kg/m^3) -hot air balloons \rightarrow the density of hot air is lower than the density of cool air so the weight of the cool air that is displaced is larger than the weight of the balloon



Will it float?

- The object will float if the buoyant force is enough to support the object's weight
- The object will displace just enough water so that the buoyant force = its weight
- If it displaces as much water as possible and this does not match its weight, it will sink.
- Objects that have a density less than water will always float in water, e.g., oil
- A steel bolt will float in mercury (ρ = 13.6 g/cm³)

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