

# Meteorology – Lecture 2

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# Important notes

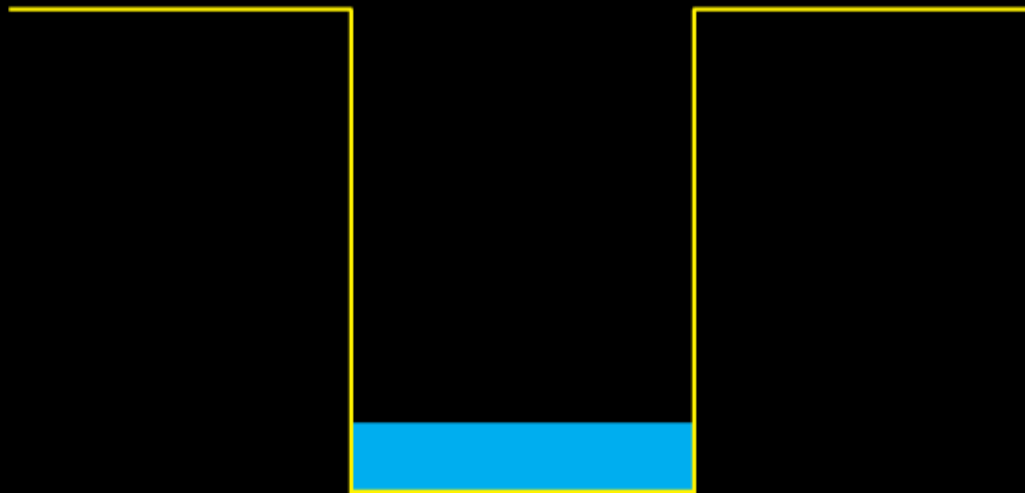
- These slides show some figures and videos prepared by Robert G. Fovell (RGF) for his “Meteorology” course, published by The Great Courses (TGC). Unless otherwise identified, they were created by RGF.
- In some cases, the figures employed in the course video are different from what I present here, but these were the figures I provided to TGC at the time the course was taped.
- These figures are intended to supplement the videos, in order to facilitate understanding of the concepts discussed in the course. *These slide shows cannot, and are not intended to, replace the course itself and are not expected to be understandable in isolation.*
- Accordingly, these presentations do not represent a summary of each lecture, and neither do they contain each lecture’s full content.

Animations linked in the PowerPoint version of these slides may also be found here:

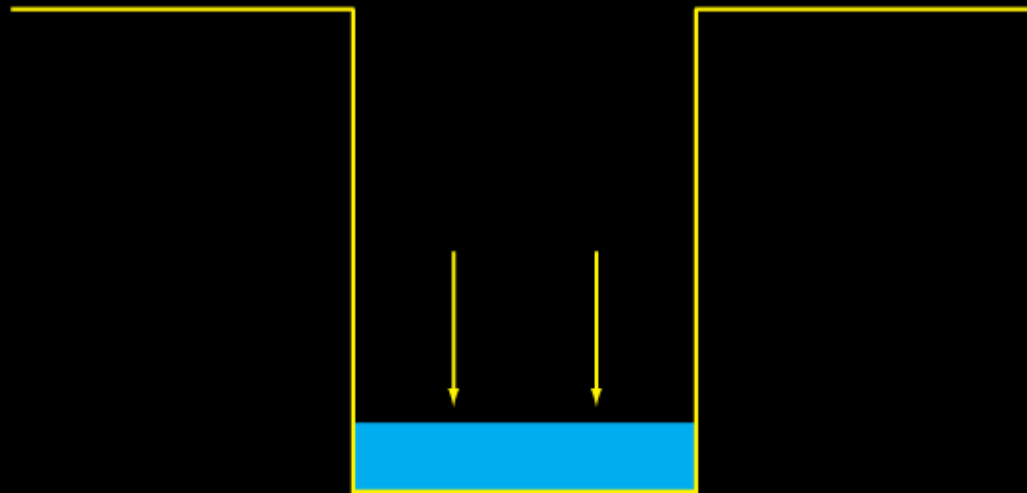
<http://people.atmos.ucla.edu/fovell/meteo/>

# Barometer

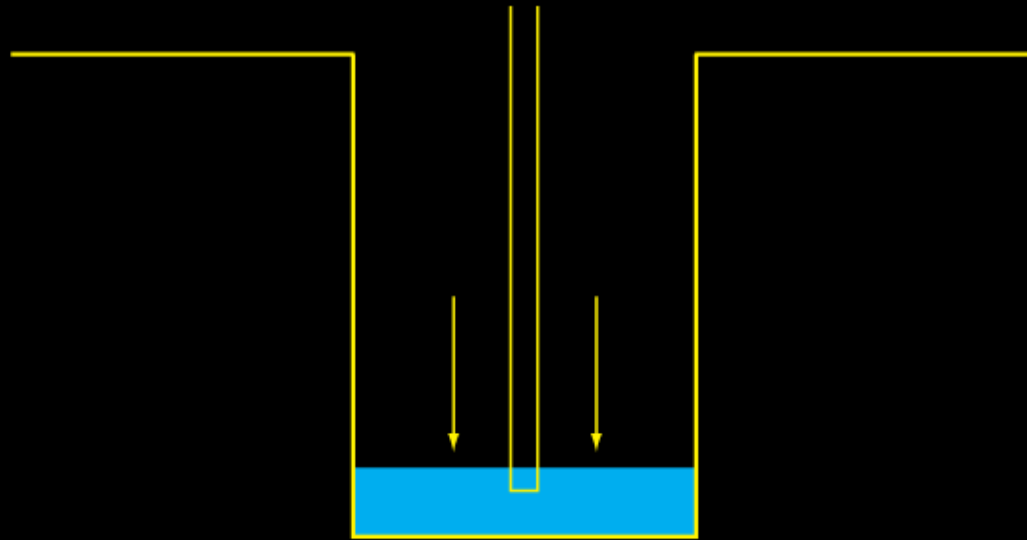
Picture water well or a glass  
partly full of water



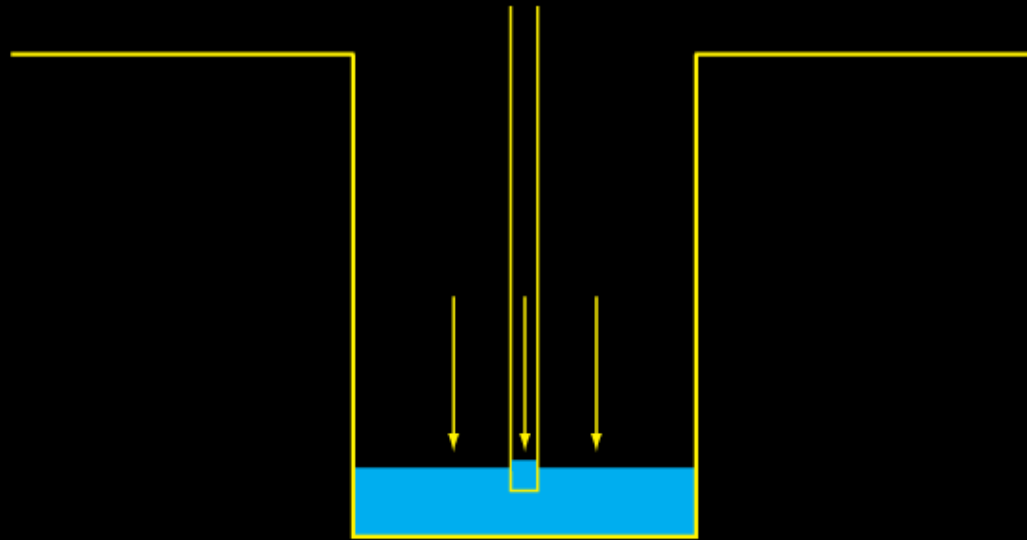
Atmospheric pressure is being  
exerted onto plane surface of  
water



Now insert a tube or straw

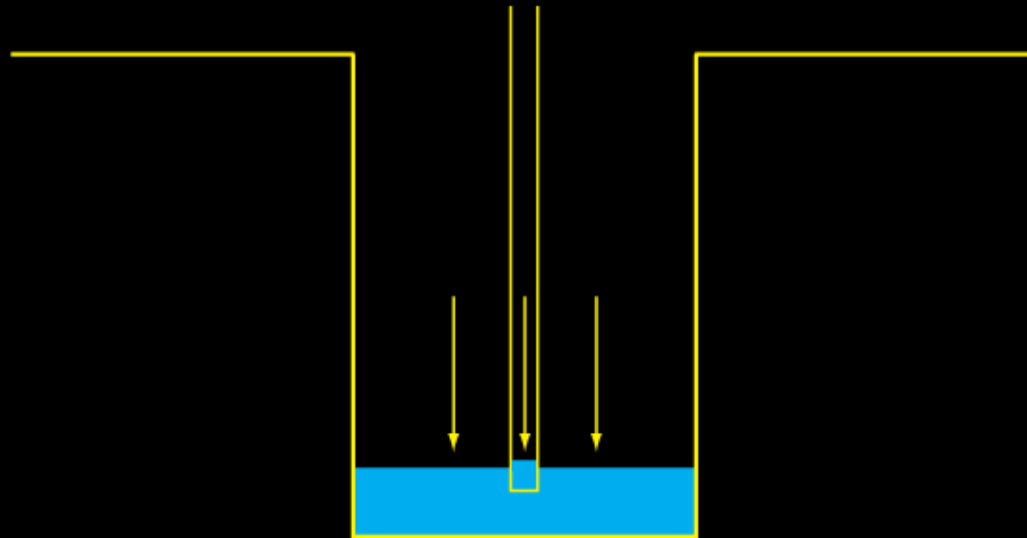


The water does rise up  
a little bit -  
but due to surface tension

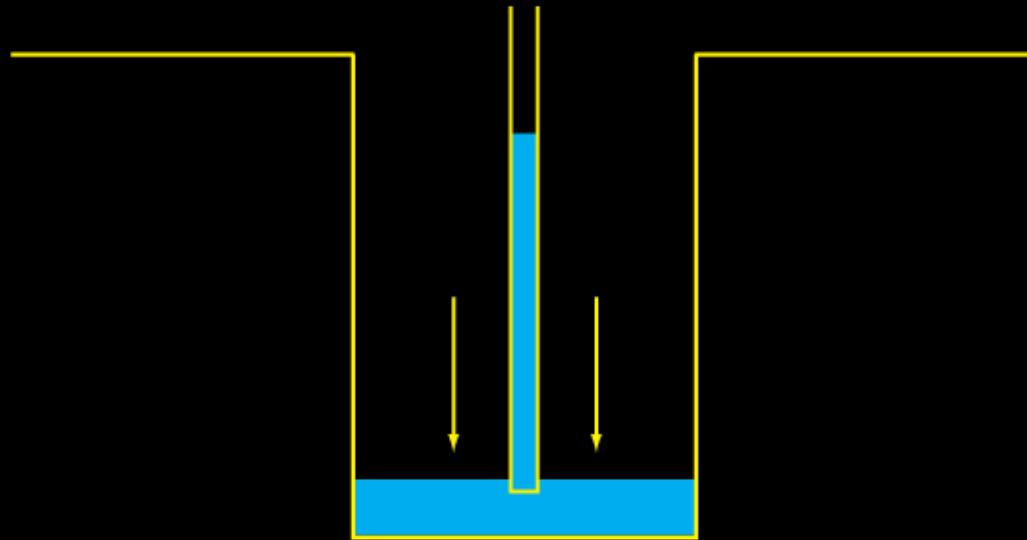




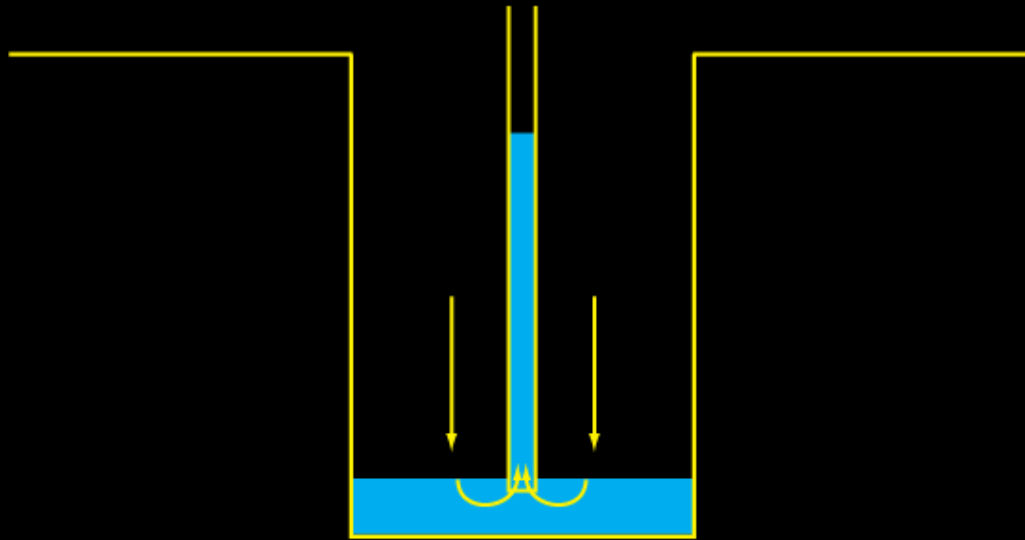
Water doesn't rise farther since  
there is also air in tube pushing  
down



To get **water** out through tube,  
the *first* thing is to get the **air** out  
- creating a vacuum

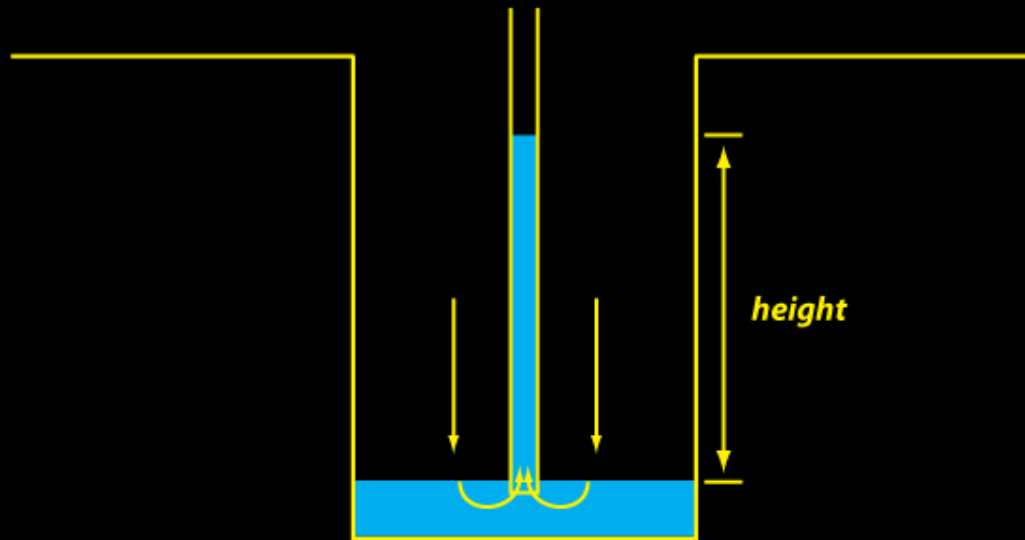


Once vacuum is created, the **atmosphere**  
does the job of pushing water up into tube  
from **below**



NOW the difference between the top and base of fluid column indicates how much force exists pressing down outside. And force per unit area is pressure

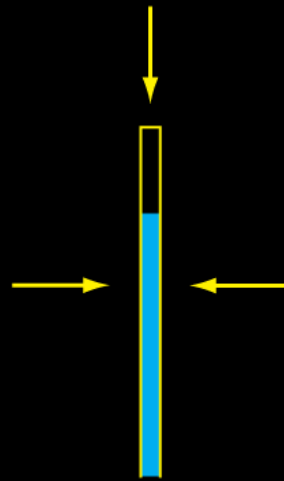
This is a **barometer**



# Demonstration: water in straw



- Let's take a closer look
- Straw is sealed at the top by my finger
- Straw is OPEN at the bottom



- Atmospheric pressure is pressing down on top - no effect since sealed
- Pressure also acts on straw's sides ... no effect since straw rigid, inflexible

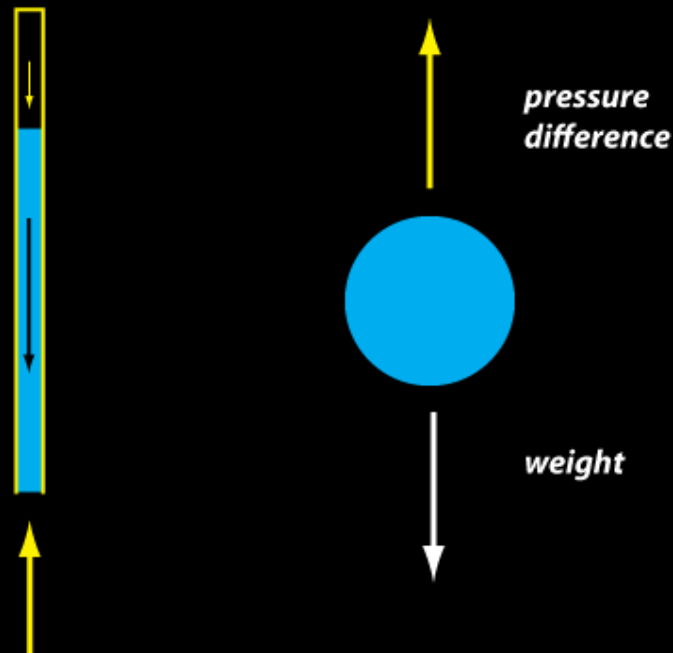


- But atmospheric pressure also presses **UPWARD** from below
- And inside the straw, the small amount of air above the water also has weight, and presses down
- Here, the pressure difference is **upward**.

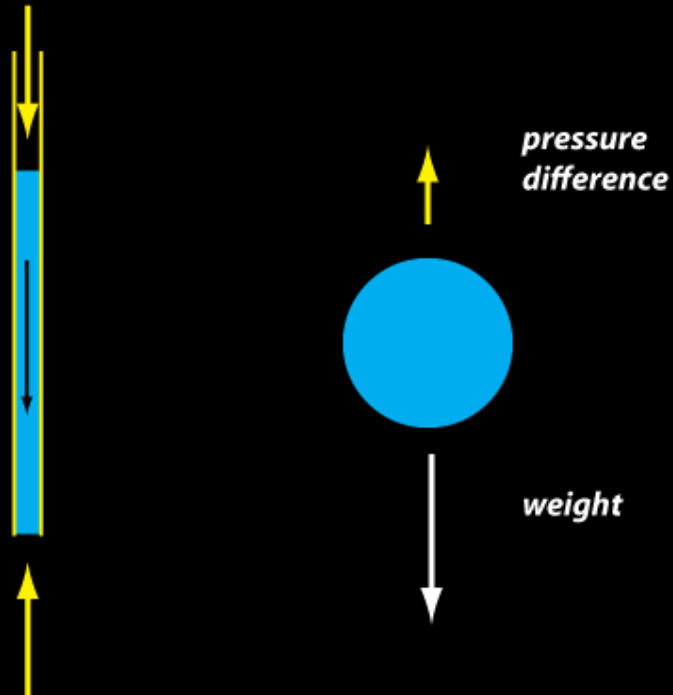


# Hydrostatic balance

Straw sealed - we have hydrostatic balance. Two powerful opposing forces, but no net motion.



Remove finger - forces now imbalanced. Water flows out. Why?



[end]