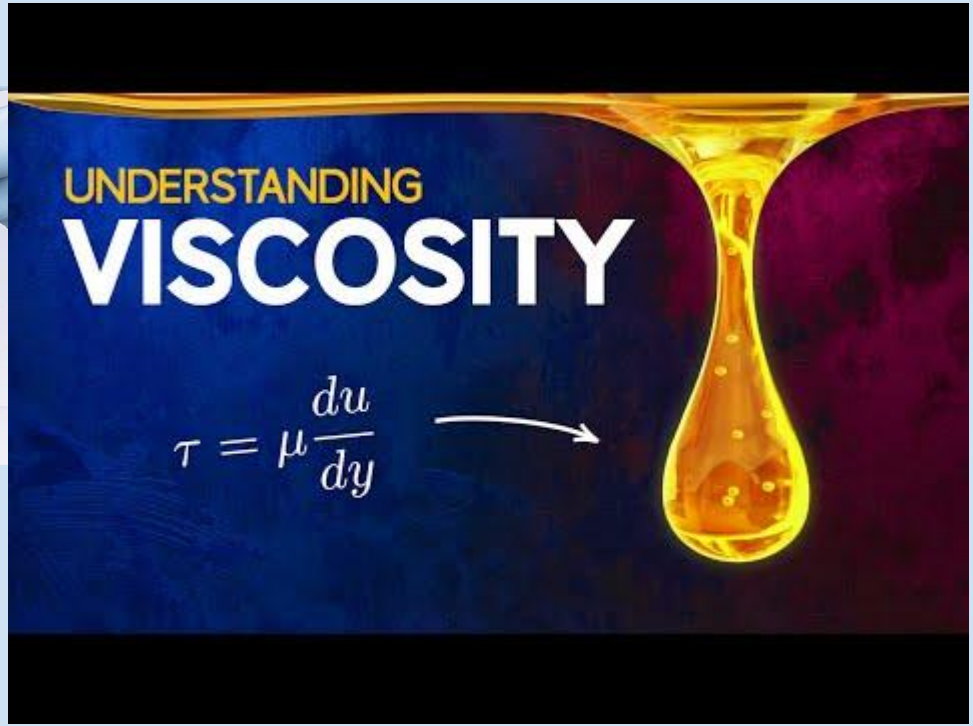
Engineering Concepts in Fluid Mechanic

By: Chanakarn Pensiri, Miranda Cooper, Nicolas Isidro

Viscosity


2MC
What
is
Viscosity?


UNDERSTANDING
VISCOSITY
$\tau = \mu \frac{du}{dy}$

How Viscosity Related to Engineering?

- Engineers create machinery that transfers fluids, lubricates with fluids, or functions in fluid-filled environments. Example: Engines & Printers

- Viscosity is how engineers measure the resistance of fluids to shear stress by using Dynamic Viscosity.

- Shear stress relates to the amount of force applied over an area in m squared

$$\mu = \tau \frac{y}{u}$$ **Dynamic viscosity**

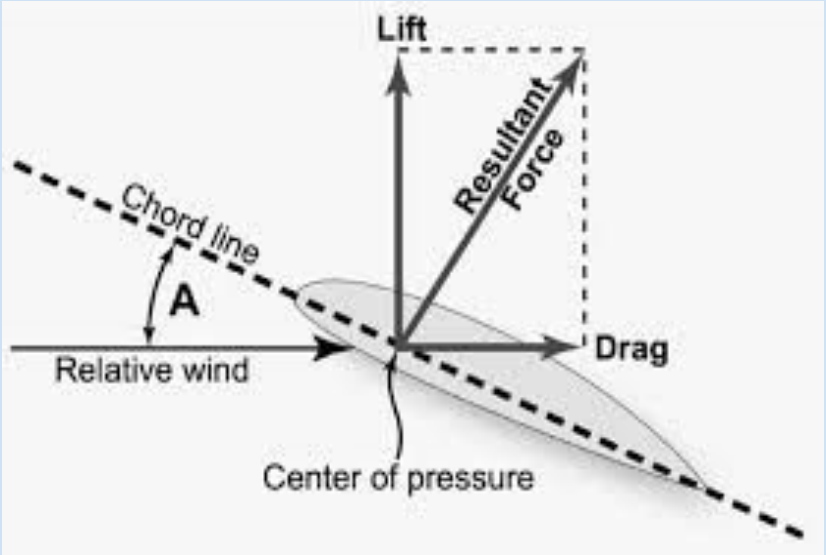
μ → Dynamic Viscosity

τ → shear stress

y → distance between the layers

u → shear velocity

Drag & Lift

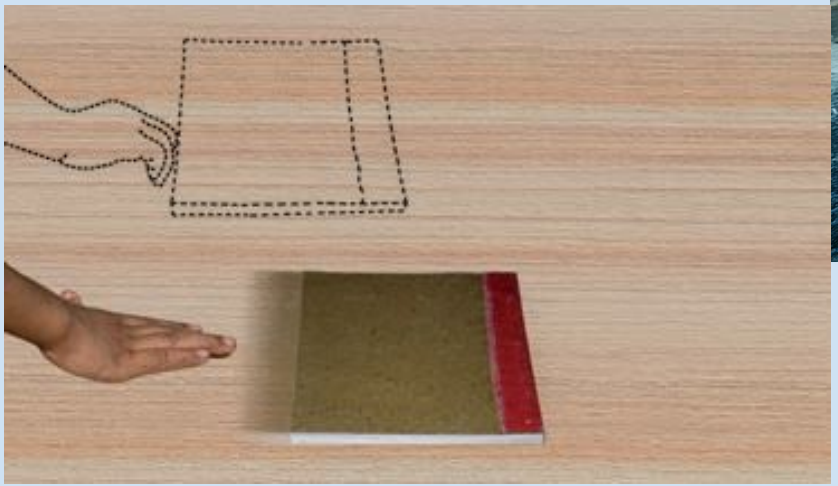

Lift
Resultant Force
Chord line
A
Drag
Relative wind
Center of pressure

Drag & Lift

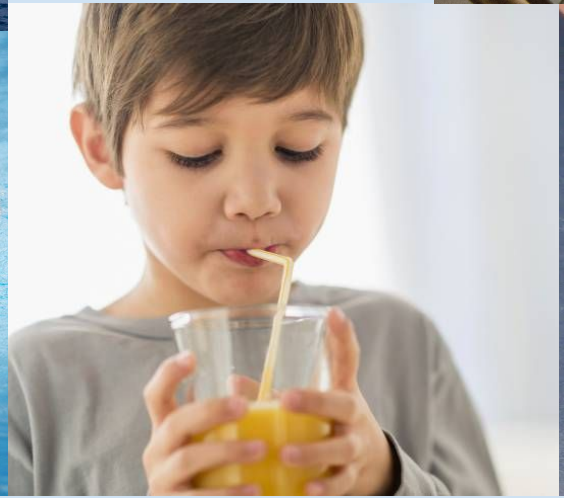
To Engineers the lift-to-drag ratio is perhaps the most important consideration in designing airfoils, such as airplane wings and turbine blades.

Friction

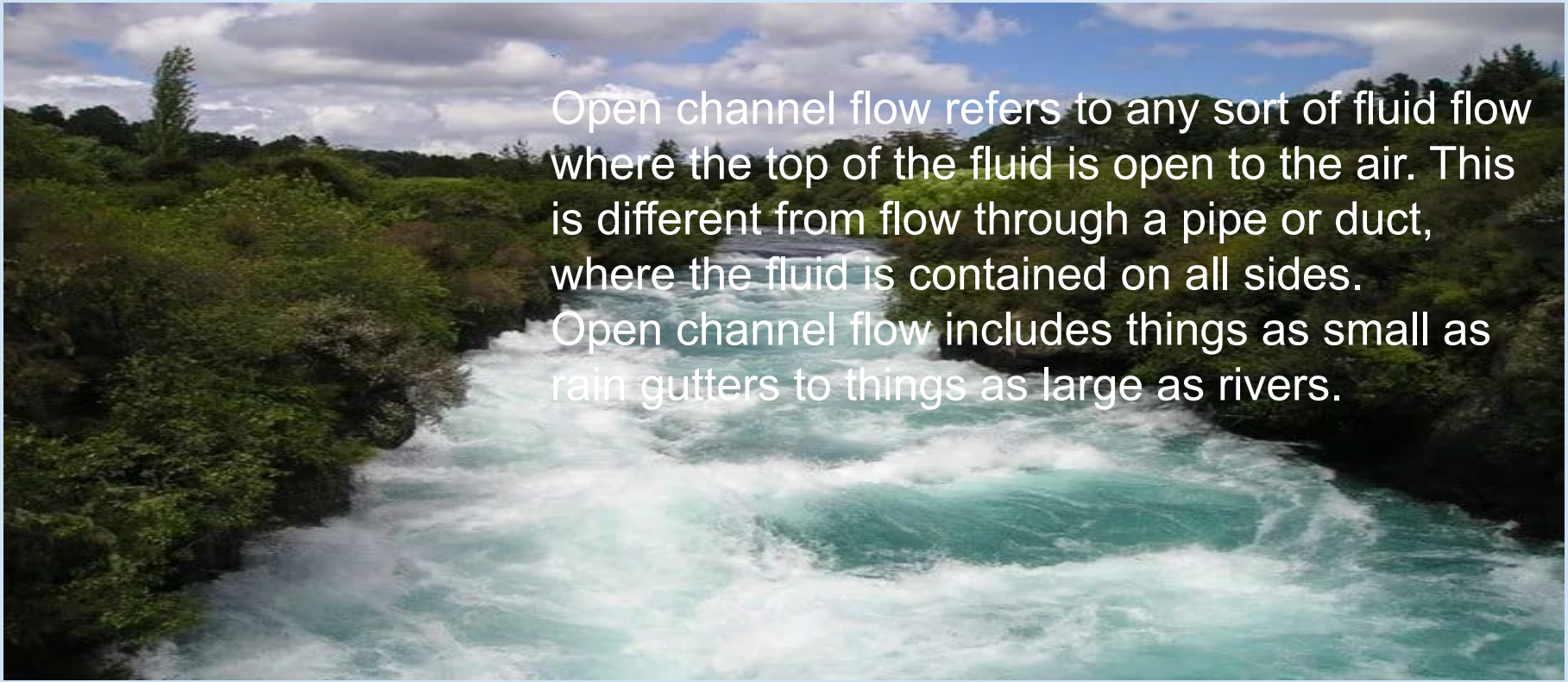
Friction is the force exerted by two surfaces sliding across one another. When you try to push a book across the floor, for example, friction makes it harder.



Friction



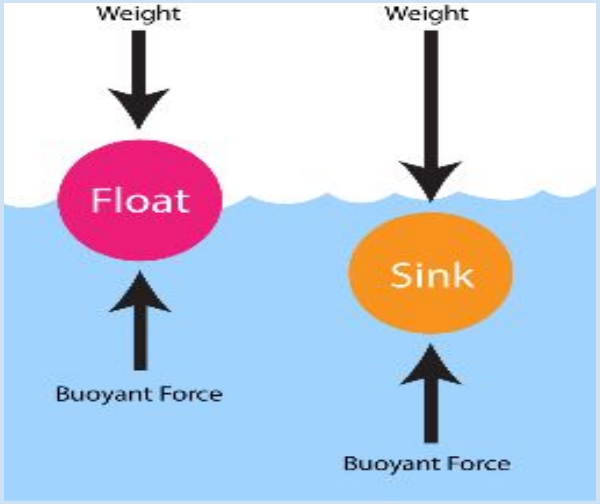
Open Channel flow



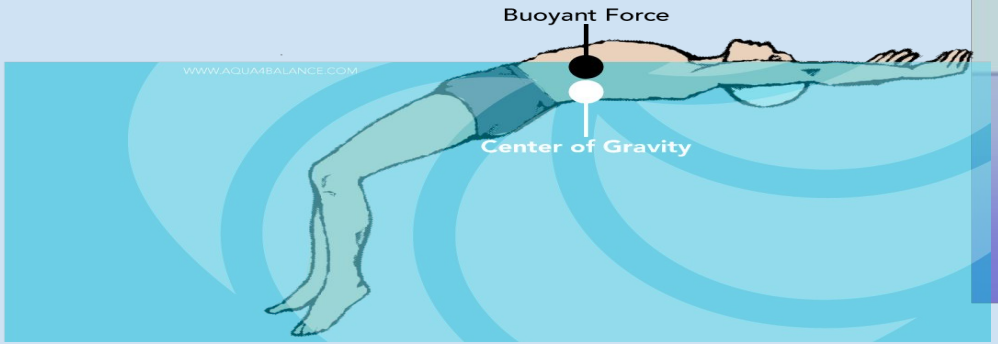
Open channel flow refers to any sort of fluid flow where the top of the fluid is open to the air. This is different from flow through a pipe or duct, where the fluid is contained on all sides.
Open channel flow includes things as small as rain gutters to things as large as rivers.

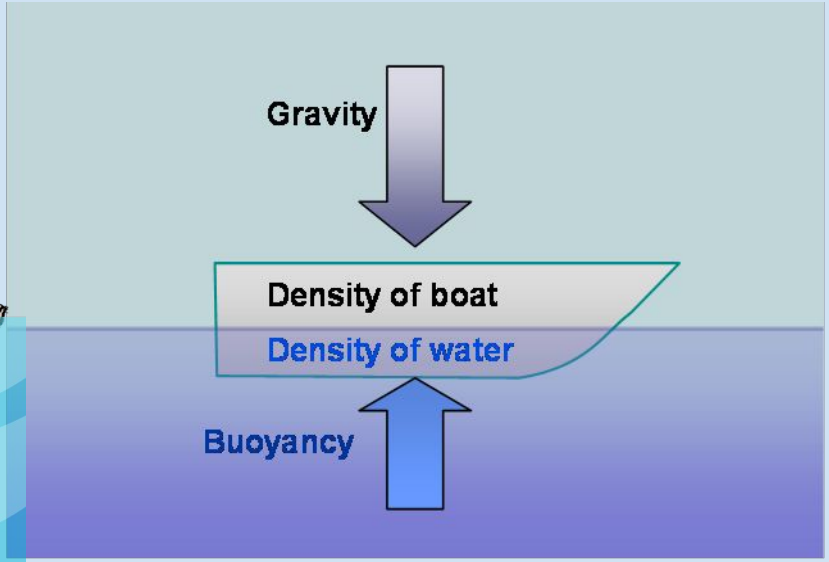
Open Channel Flow

Buoyancy

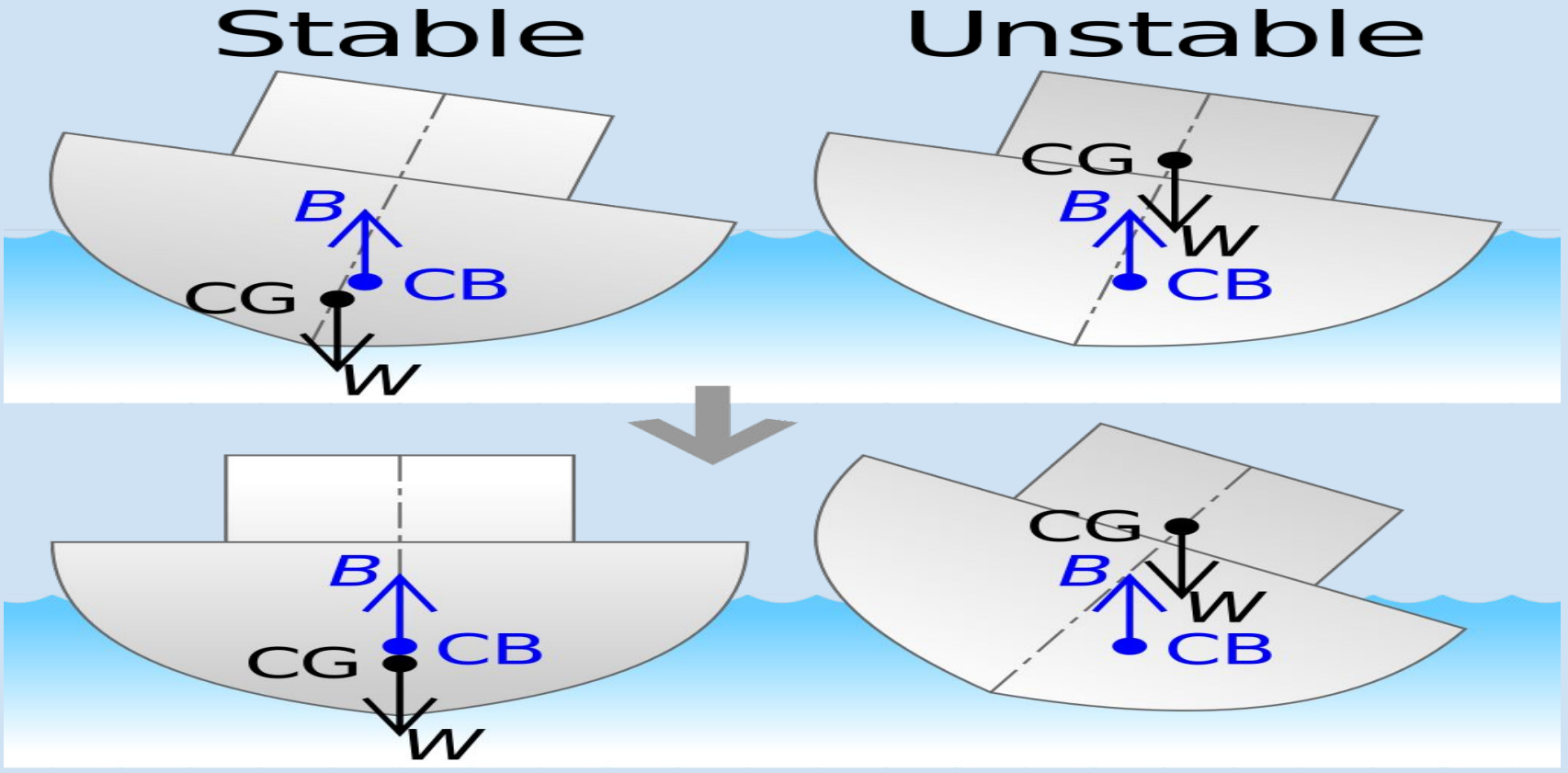


Buoyancy is the force that causes objects to float. An object displaces an amount of fluid equal to its weight. This is known as the Archimedes Principle. Because of this, objects denser than the fluid will sink, while objects less dense than the fluid will float.





Buoyancy



Kahoot!