Aerodynamics Study Guide

Newton has three laws of motion. They are as follows:

(1) A body at rest will remain at rest, and a body in motion will remain in motion, unless acted upon by an outside force.
(2) Force is equal to mass times acceleration. F = MA
(3) For every action there is an equal and opposite reaction.

Bernoulli's principle of pressure states:

An increase in the speed or movement of flow will cause a decrease in the fluid's pressure.

Lift is generated through a combination of the theories of both Bernoulli and Newton. Remember that air is a fluid, so the theories apply to air and regular liquids in general.

The Coanda affect is the tendency for a fluid to follow the object along its flow path. This helps explain why air wants to adhere to an airfoil, such as a wing.

The equation for determining weight and balance of an aircraft is:

Weight x Arm = Moment

The center of gravity range for the Piper Archer is 82" – 93" aft of datum. This means that the envelope itself is only 11 inches!

Center of Pressure (COP) is different than the center of gravity. The COP varies with the angle of attack at any given moment.

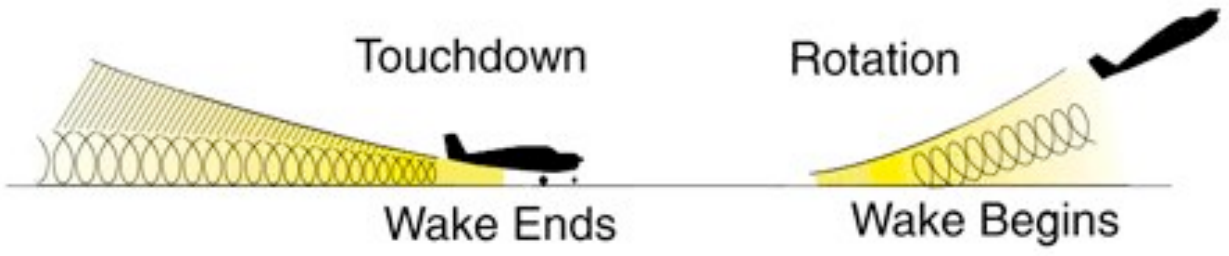
There are two main types of drag:

(1) Parasitic
(2) Induced

Three types of drag are categorized as parasitic drag. They are:

(1) Form drag
(2) Interference drag
(3) Skin friction

Wingtip vortices are a result of induced drag. Know how to avoid the wake turbulence that is generated from large aircraft:



Always land beyond an aircraft generating significant wingtip vortices; rotate prior to their rotation point. ALWAYS give yourself plenty of time to avoid them. Remember to sidestep upwind.

There are two types of stability:

(1) Static = the aircraft's initial response
(2) Dynamic = the aircraft's response over a period of time

Stability is categorized as being negative, neutral, or positive.

The area that the phenomena associated with ground effect will be encountered is from the surface to 18 feet above the ground. This is for the Piper Archer only! It is calculated by dividing the total wing span by two.

An airplane will **ALWAYS** stall when the critical angle of attack is exceeded.

For the Piper Archer the stall speeds are:

Vs (Clean) – 50 KIAS
Vso (With flaps) – 45 KIAS

Please reference the Pilot's Handbook of Aeronautical Knowledge, for more information. Or, ask a RMC flight instructor for assistance with additional questions. Fly Safe!