

What Flight Training Teaches You About the Four Forces

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Every pilot will learn the basics of [aerodynamics](#) during [flight training](#). It is important to have a clear understanding as a pilot of the fundamentals of air travel. Here are a few basic definitions to get you started.

Total Aerodynamic Force

Total aerodynamic force is the sum of the drag and lift. The amount of force generated is dependent on the orientation of the wind, engine, and gravity.

1. Thrust

Thrust is the force that moves the airplane forward. The thrust is produced by the power of the engine. It is directed forward along the axis of the engine.

2. Drag

[Drag](#) holds the airplane back, it is considered to be the air resistance opposing the motion of the aircraft, running parallel and opposite to the oncoming flow of air. Since thrust is the force that moves the airplane forward, drag is the motion directly opposite of thrust.

3. Weight

Weight is the force directed downward from the center of mass of the aircraft towards the center of the earth. It is proportional to the mass of the airplane times the strength of the gravitational field.

4. Lift

[Lift](#) is what keeps the airplane airborne. The force that is perpendicular to the direction of the oncoming flow of air. Can be explained by three theories:

- Bernoulli's principle - the pressure of a moving gas decreases as its velocity increases. The air flows faster over the curved upper surface of the wing than the flat lower surface, so the greatest pressure is enforced upward
- Coanda effect - which moving air is attracted to and flows along the surface of the wing, and the tilt of the wing, called the angle of attack, causing the air to flow downward as it leaves the wing.
- Newton's third law of motion - the greater the angle of attack, the greater the downward flow, abides to an equal and opposite reaction, so the aircraft is deflected upward.

These are just a few of the most basic definitions you will learn during [flight training](#). It will be beneficial to you to get a head start on your research before heading off to [flight training school](#) as some of the technical material can be a little overwhelming.

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