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Factors affecting Lift

(adapted from https://www.grc.nasa.gov/WWW/K-12/airplane/factors.html)

All you need to [create lift](https://www.grc.nasa.gov/www/k-12/airplane/right2.html) is to turn a flow of air. An aerodynamic, curved airfoil will turn a flow. But so will a simple flat plate, if it is inclined to the flow. The [fuselage](https://www.grc.nasa.gov/www/k-12/airplane/fuselage.html) of an airplane will also generate lift if it is inclined to the flow. For that matter, an automobile body also turns the flow through which it moves, generating a lift force. Lift is a big problem for NASCAR racing machines and race cars now include [spoilers](https://www.grc.nasa.gov/www/k-12/airplane/spoil.html) on the roof to kill lift in a spin. Any physical [body](https://www.grc.nasa.gov/www/k-12/airplane/lift2.html) moving through a fluid can create lift if it produces a net turning of the flow.

There are many factors that affect the turning of the flow, which creates lift. We can group these factors into(a) those associated with the object, (b) those associated with the motion of the object through the air, and (c) those associated with the air itself:

1. **Object:** At the top of the figure, aircraft [wing geometry](https://www.grc.nasa.gov/www/k-12/airplane/geom.html) has a large effect on the amount of lift generated. The [airfoil shape](https://www.grc.nasa.gov/www/k-12/airplane/shape.html) and [wing size](https://www.grc.nasa.gov/www/k-12/airplane/size.html) will both affect the amount of lift. The ratio of the wing span to the wing area also [affects](https://www.grc.nasa.gov/www/k-12/airplane/downwash.html) the amount of lift generated by a wing.
2. **Motion:** To generate lift, we have to [move the object](https://www.grc.nasa.gov/www/k-12/airplane/move.html) through the air. The lift then depends on the [velocity](https://www.grc.nasa.gov/www/k-12/airplane/vel.html) of the air and how the object is [inclined](https://www.grc.nasa.gov/www/k-12/airplane/incline.html) to the flow.
3. **Air:** Lift depends on the [mass](https://www.grc.nasa.gov/www/k-12/airplane/density.html) of the flow. The lift also depends in a complex way on two other [properties](https://www.grc.nasa.gov/www/k-12/airplane/airsim.html) of the air: its viscosity and its compressibility.