Flight

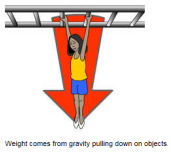
Four Forces of Flight

Before a person can understand flight, they must first learn about forces that control flying.

A **force** is a push or a pull in any direction

1) Gravity Force (Weight)

- Gravity is an invisible force that pulls towards the center of the earth. This is a downward "pull" that works against things that are trying to fly.


Weight comes from gravity pulling down on objects

(Because Earth has a large mass, all objects near it are pulled toward the center of earth)

2) Drag Force

- Drag is force that slows you down and works in the opposite direction than you are travelling. For example, when a parachute on a dragster opens up after the race, it creates a drag force that helps to slower the car down.

Drag is a force that pulls back on something trying to move. Drag provides resistance, making it hard to move. For example, it is more difficult to walk or run through water than through air. Water causes more drag than air.

As an object moves through the air, it pushes aside air molecules.
Credits: NASA

Drag depends on shape

The shape of an object also affects the amount of drag. Round surfaces usually have less drag than flat ones. To improve performance (206-6)

Narrow surfaces usually have less drag than wide ones. The more air that hits a surface, the more the drag the air produces.

Drag depends on speed (drag increases as speed increases)

Four Forces of Flight (continued)

3) Lift is a force upward. If the lift force is greater than the gravity force,the object will stay in the air.

(Opposite to gravity)

lift force

4) Thrust is the force that moves an airplane forward and usually produced by a planes engines.

(Opposite to Drag)

Here are some facts you should know about lift:

Discussed in a bit

a) Lift depends on shape (lift is greater with an airfoil-shaped wing than with a flat wing).

b) Lift depends on angle of attack (up to a point, lift increases as the angle of attack increases; beyond that point, lift is lost)

c) Lift depends on speed (Lift increases as speed increases)

d) Lift depends on direction (lift acts perpendicular to the direction of the object's movement)