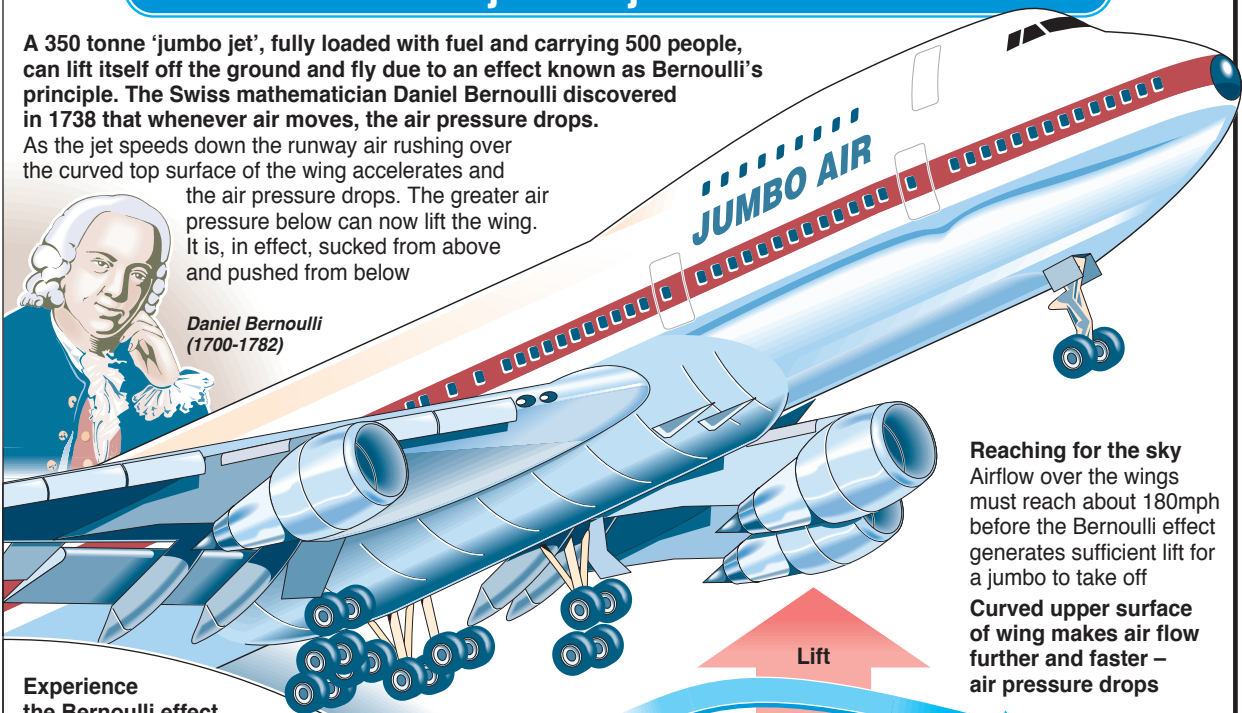
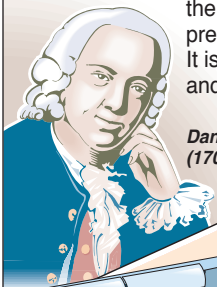


How does a 'jumbo jet' lift into the air?

A 350 tonne 'jumbo jet', fully loaded with fuel and carrying 500 people, can lift itself off the ground and fly due to an effect known as Bernoulli's principle. The Swiss mathematician Daniel Bernoulli discovered in 1738 that whenever air moves, the air pressure drops.

As the jet speeds down the runway air rushing over the curved top surface of the wing accelerates and the air pressure drops. The greater air pressure below can now lift the wing. It is, in effect, sucked from above and pushed from below

Daniel Bernoulli
(1700-1782)



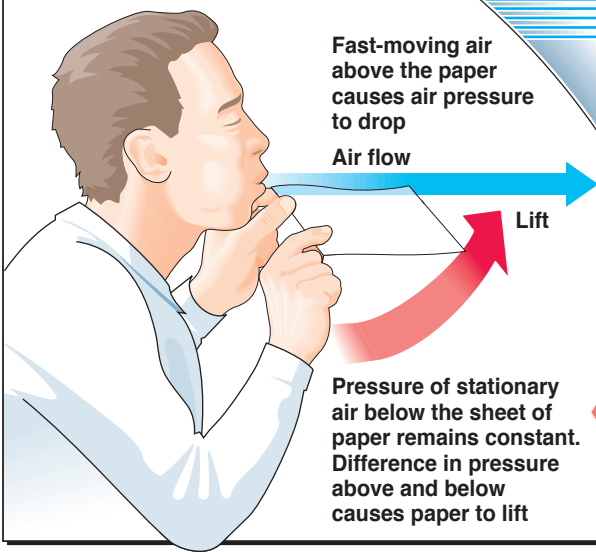
Reaching for the sky

Airflow over the wings must reach about 180mph before the Bernoulli effect generates sufficient lift for a jumbo to take off

Curved upper surface of wing makes air flow further and faster – air pressure drops

Experience the Bernoulli effect

Take a sheet of tissue paper and blow hard over the top. As you blow the sheet of paper begins to rise

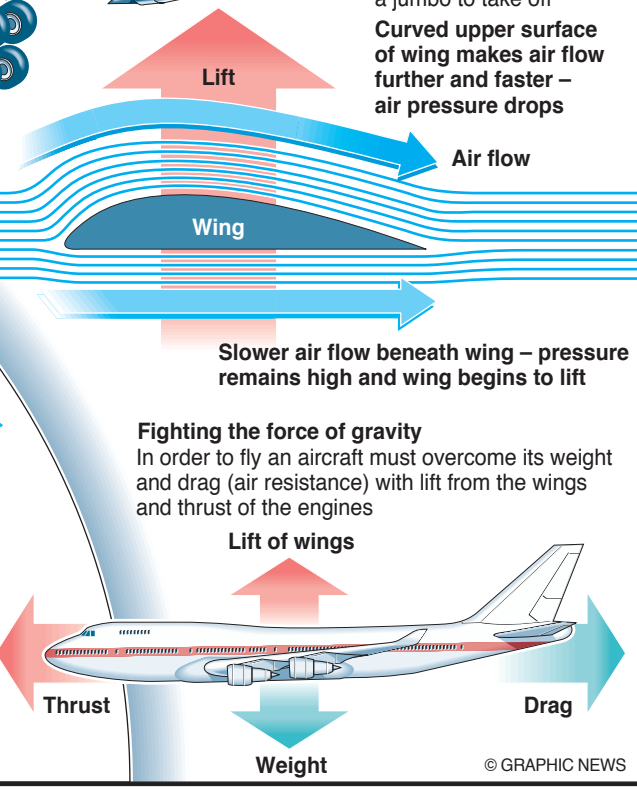


Fast-moving air above the paper causes air pressure to drop

Air flow

Lift

Pressure of stationary air below the sheet of paper remains constant. Difference in pressure above and below causes paper to lift



Lift

Air flow

Wing

Slower air flow beneath wing – pressure remains high and wing begins to lift

Fighting the force of gravity

In order to fly an aircraft must overcome its weight and drag (air resistance) with lift from the wings and thrust of the engines

Lift of wings

Thrust

Weight

Drag