

4.4 Let's Fly Away

Pip and Pep are talking about flying to Europe this summer. They're wondering how airplanes stay in the air.

Pip: *(excited)* I can't wait for our trip to Europe this summer. It's pretty cool that you can come with my family.

Pep: I've wanted to travel all my life, but my Dad won't fly on airplanes.

Pip: *(puzzled)* Really? That's weird. It seems like everyone flies these days.

Pep: Yeah, but I can see his point. He doesn't understand how planes can stay in the air.



Pip: Weren't we just learning about the forces that act on airplanes in physics class?

Pep: *(pensive)* I wonder if we can remember how planes stay up. Maybe then I could explain it to my Dad.

Pip: Yeah. Then maybe he'd come with on our trip.

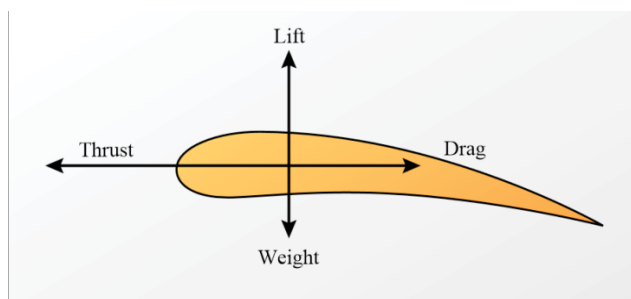
Pep: I'd like that. Let's see . . . I think there were four major forces: lift, drag, thrust, and weight. Does that sound right?

Pip: I think so. We know weight depends on the mass of the plane, and that acts downward, so we need to think about the lift force.

Pep: Right. Thrust force makes it go forward and comes from the propulsion system.

Pip: Yup. And Drag force slows the plane down because of air resistance.

Pep: So Lift force is the one we need to understand to keep the plane in the air.



Pip: Remember when our physics teacher told us about the special shape of airplane wings?

Pep: Yeah, she said that the top of the wing has a bulge and the bottom doesn't.

Pip: That's so the sheet of air has to travel farther over the top of the wing compared to the bottom of the wing.

Pep: Since air is a fluid, it is cohesive and acts like big sheets that stick together.

Pip: If the air travels farther over the top, but still sticks together, that must mean that the air has a faster speed over the top of the wing compared to the bottom of the wing.

Pep: Oh yeah. Now I remember. That's Bernoulli's Principle. The faster a fluid moves, the lower the pressure next to it.

Pip: So the air moves faster on the top of the wing causing less pressure on the top.

Pep: That's right. So the greater pressure under the wing pushes the airplane upward.

Pip: (*amazed*) Wow! I think we've got it. I wonder who came up with this idea.

Pep: Daniel Bernoulli was the guy that figured out a lot of stuff about aerodynamics.

Pip: His father, John Bernoulli, was also a famous scientist. He worked in mathematics and was an early developer of calculus. (*groan*)

Pep: Daniel and his father didn't get along very well. The story goes that they both entered a science contest and were tied for first place. The father got jealous and disowned Daniel.

Pip: Families sure can be strange. My Dad would never do that.

Pep: Mine either, Now how can we explain this stuff to my Dad?

Pip: Maybe we can find some pictures. I always learn better if I can see a diagram of something.



Pep: This diagram shows the airstreams as they move around the airplane wing and how the wing gets pushed up from the lift force.

Pip: I hope this works for your Dad.

Pep: Me, too. I'd love to have him come with us on the trip.

Author - Marian Schraufnagel

© 2013 Moose Moss Press

wing diagrams from:

http://commons.wikimedia.org/wiki/File:Kridlo_letadla.svg

http://commons.wikimedia.org/wiki/File:Arabic_-_Aeroforces.png