

Wind Tunnel Demonstration

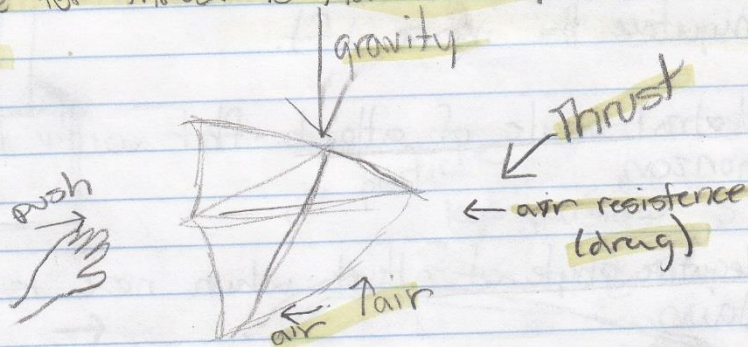
What happened
why

LT: Identify evidence for the four forces of flight: lift, thrust, drag, and gravity.

Gravity is the force that pulls us or the airplane down. Gravity also makes the airplane fly.

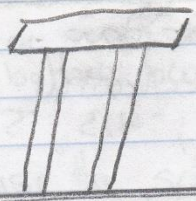
Drag is resistance you move through the air.

Thrust is the forward force on the airplane. Evidence for thrust is that the airplane keeps flying.



Data: Styrofoam

-4.6	-5.0	-5.2	-3.8	-5.1
-4.7	-4.9	-5.8	-4.6	-4.0
-4.0	-5.0	-4.4	-5.0	-5.4
-3.8	-5.5	-4.6	-4.5	-
-4.0	-5.1	-4.7	-5.0	-
-4.6	-5.0	-4.0	-5.6	-



Data collected from wind tunnel. When flat it is a negative set of numbers

Data: Styrofoam

2	10	13.9	12
8	11.7	12.2	12.1
4	13	11.7	13.6
6	13.5	12.6	11
9	14.3	12.8	13.7

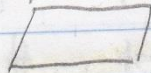


Data collected from wind tunnel. When clay is tilted foam up makes positive #s

-9, -15.4, -16, -17, -18, -19.6, -19.6
 -19.1, -17.3, -18.4, -20.2, -18.6, -19.1



when clay lifts foam up against
 the wind it makes negative lift



The negative number means lift. The more
 negative the more lift.

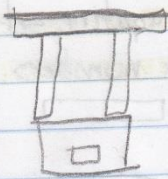
Neutral angle of attack - flat with the
 horizon.

Negative angle of attack - when nose is angled
 down.

Positive angle of attack - when nose is angled
 up. Just above the horizon.

Newtonian Lift - action-reaction Lift

← air flow



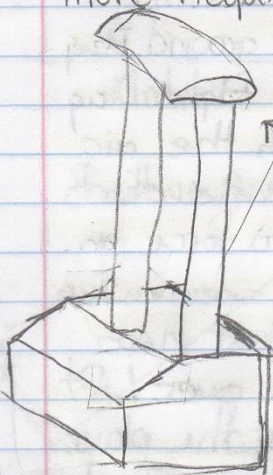
Data: Neutral Angle block styrofoam

-3.1, -4.3, 5, 5.5, 5.6, 5.1, 5.4, 5.3,
 5.8

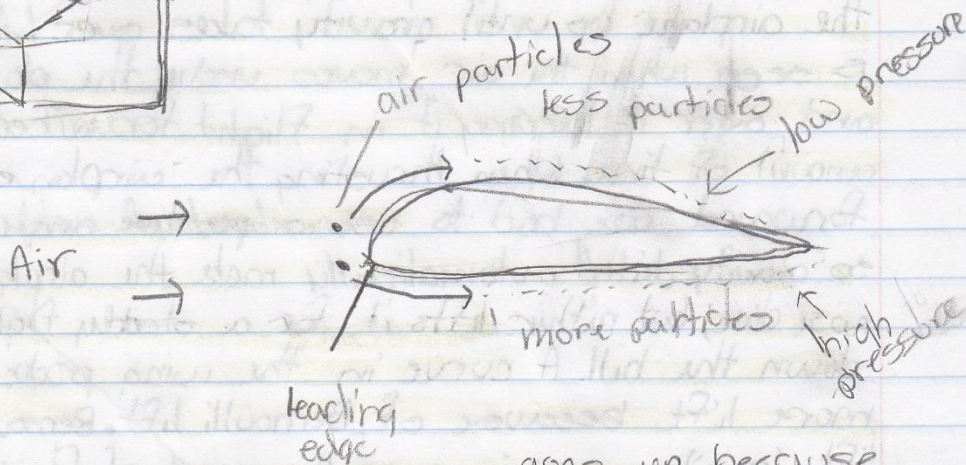
This data comes from lift. This has a slight
 lift.

Data: Neutral - traditional wing cross section
1, -5.7, 8.1, -8.8, -9.2, -9.1, -10.8, -10.2, -10.7,
-10.1, -9.6, -10.7, -10.3, -10.4, -11.1

more negative numbers means more lift



* Curve produces more lift
neutral angle of attack



goes up because
there is a high pressure
on bottom low on top

Bernoulli Lift: When you increase the speed of
fluid, the pressure drops

Analysis:

In this demonstration we learned about the four forces of flight, lift, thrust, drag and gravity. Gravity is the force that pulls down on the airplane when it is in flight. Evidence of gravity is the fact that at some point the airplane is pulled to a stop on the ground. Drag is seen when the airplane is in flight. Drag is the resistance of moving through the air. So, drag is in action when the airplane starts to slow down. Thrust is the forward force on the airplane, evidence for thrust is seen when the plane keeps flying. Lift is what keeps the airplane up until gravity takes over. Lift is seen when the air moves under the plane and over it keeping it in flight for a certain amount of time. When thrusting the airplane forward we had to use a positive angle of so gravity didn't automatically make the airplane nose dive, but rather lifts it for a steady flight down the hill. A curve in the wing produces more lift because of Bernoulli lift. Bernoulli lift is when you increase the speed of fluid, the pressure drops.