

Competition: Flying machines 101

Competition Type: Rubber band powered airplane

Objective: Design, build, test and compete with an original flying machine assembled from various scavenged and homemade parts

Engineering Discipline: Aeronautical Engineering, Mechanical Engineering

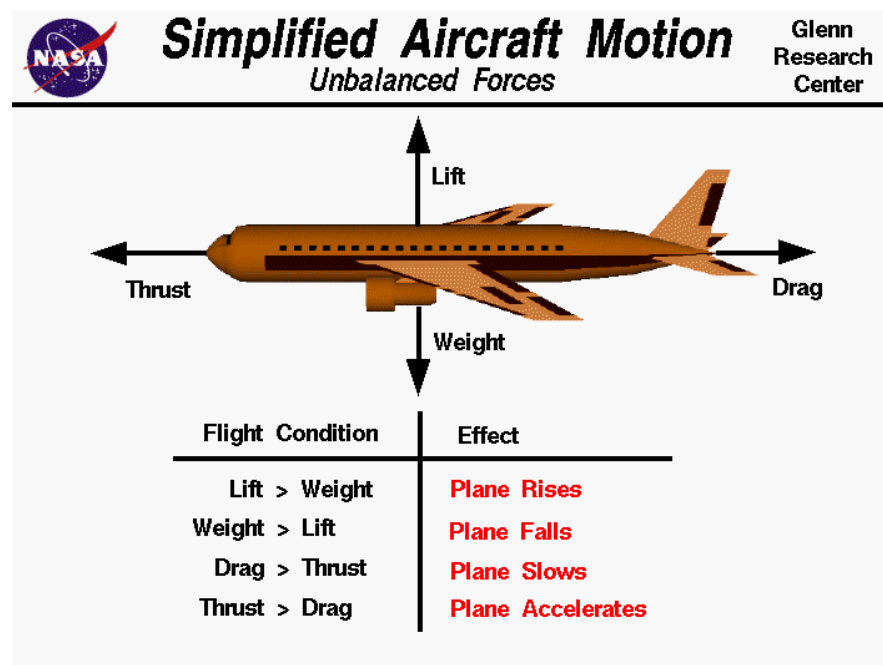


Figure 1 – Aerodynamic forces during flight. Note: stable flight requires that the plane's center-of-lift be close to its center-of-gravity.

Evaluation:

Your base score will be based on the length of time of flight (“hang-time”). To qualify as an "airplane", your flying machine must be capable of producing a lift force that is greater than the plane's weight.

Design/Material Constraints:

- No kits are allowed. The plane must be of your own design. You may use purchased materials but no pre-made components except for the propeller assembly.
- The flying machine is to be powered by a single rubber band and single propeller.
- The propeller must be a two-blade design measuring less than 180 mm from tip-to-tip.
- The propeller, shaft, and mount assembly may be either hand-made or purchased.

- The plane, ready for flight, must weigh less than 35 grams.
- The plane may not use lighter-than-air gasses.
- The plane must be **hand launched** by a single person standing in the launch area.
- The plane must be launched safely (without danger to anyone in the area) and must remain in the 60' by 50' competition area. (see figure 2).

Procedure:

Teams will come to the competition area with launcher and plane in released energy state. The airplane will be weighed and the documentation will be reviewed by the judges to make sure the design is within specification. Students must then **hand** wind the propeller and launch within 3 minutes.

The competition area is shown in figure 2. **Note:** airplanes need to remain within the airspace immediately above the competition area in order to be scored. (This should reduce the chance of flying into an unsuspecting crowd of people.)

Students will get two attempts for a total time of 6 minutes in the launch area. These attempts need not be consecutive. Scoring time will be recorded when the plane first contacts the ground. The longest recorded flight time wins.

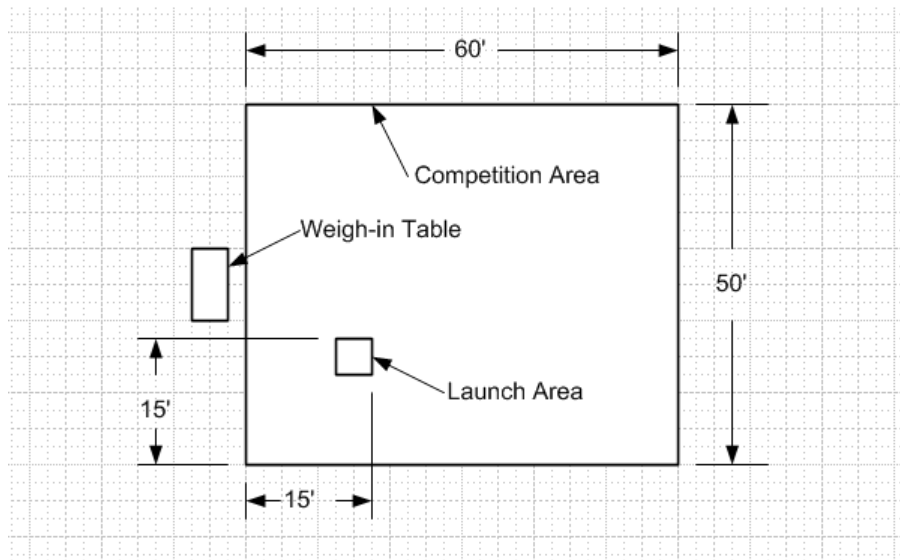


Figure 2 - Plan View of Competition Area

Engineering Documentation (5 second time bonus)

In a spreadsheet program (Excel, StarOffice, QuatroPro, Lotus 123, etc.), enter the following information:

1. Title
2. Student and School Names
3. Date
4. List of parts used in the aircraft's design tabulating:
 - Short description of each part
 - Mass of each part (grams)
 - Cost of each part (based on fair market or retail value)
5. Total Mass and Total Cost
6. Predicted flight time
7. Formatted to fit, and printed out on one page

School _____ Number _____
Student Names _____

Airplane

Trial	Time	Report Bonus (-5 sec)	Total Time (circle best time)