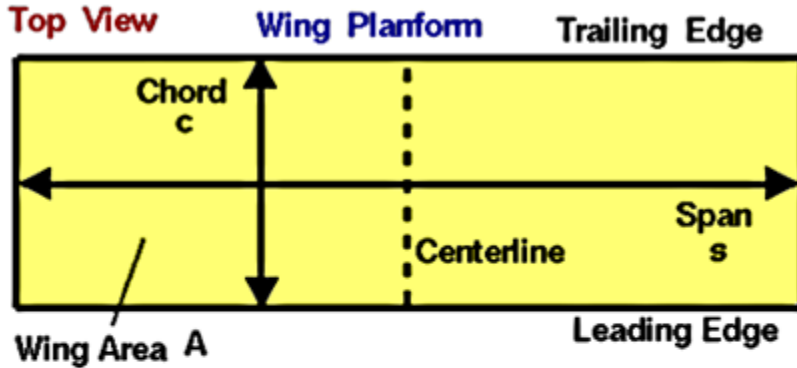


Balsa Wood Model Airplane Table Challenge

Each table will build three airplanes from balsa wood and tissue paper (a glider, R.O.G., and a Jet)

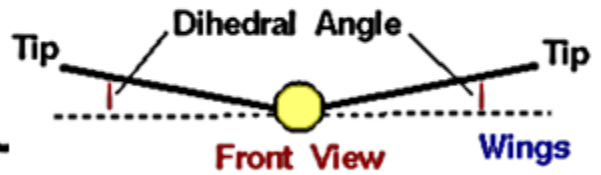
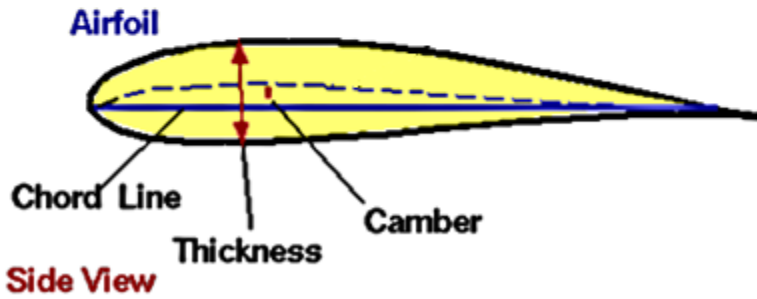
Type Aircraft	AR	Flight Stats	Start Position	Power	Building Materials
Glider	~25-30	10m flight	2 meter high	Gentle nudge	Balsa wood Tissue Paper Glue
R.O.G.	~10-15	2m take off 5m flight 1m height	Ground	Wound rubber band	
Slingshot Delta Jet	~2-5	20m flight	1.5 meter	Stretched rubber band	



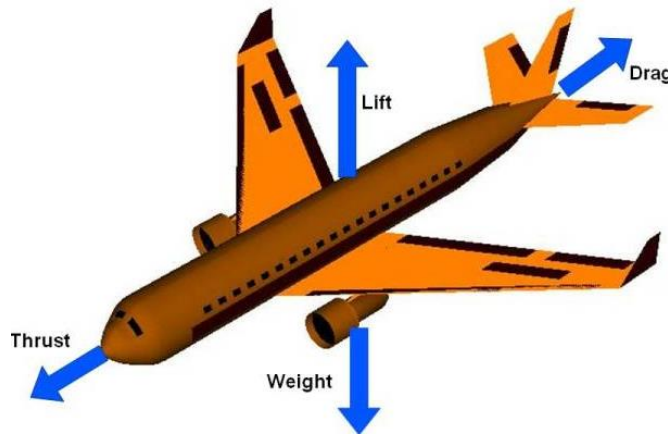
Aspect Ratio = AR

$$AR = \frac{s^2}{A}$$

$$AR = \frac{s}{c} \text{ for rectangle}$$

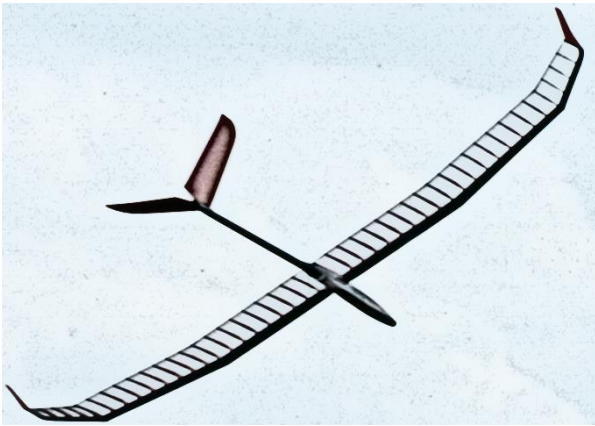


Four forces acting on an airplane



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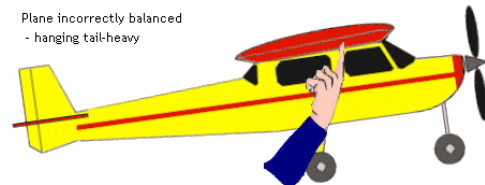
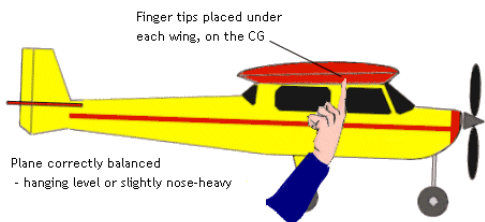
The Glider has a long skinny wingspan giving it a high aspect ratio. The camber of the wing takes advantage of generating as much lift as possible. The airplane is designed to glide slowly over a great distance. The plane is released from a height of 2m with a just a gentle push so as not to cause it to stall.



The ROG is designed to take off from the ground using small wheels or skids to prevent the prop from touching the ground. The angle of attack is such that the plane takes off rather quickly and flies a straight. Straight flight can be improved by creating a dihedral or V shape in the wing or by adding winglets at the end to help prevent air from flowing off the ends and instead over the wing. A tightly wound rubber band powers the propeller allowing this airplane to take off and then glide to a landing.



The slingshot delta jet is a triangle or sweptback wing design (think paper airplane style) with a low aspect ratio. This plane is designed to travel at a high velocity if the AR is too big then the wings would just rip right off. The plane is powered by a stretched rubber band attached to a “hook” notched out if the fuselage of the plane near the front and the other end is attached to a stick. You pull the plane backward to stretch the rubber band and then release it. This plane should have a low angle of attack and very little if any camber in the wings.



The center of mass of all three airplanes should be somewhere under the wing. This means that a well-trimmed airplane should be able to balance on the end of one of your fingers with your finger being somewhere under the wing near the middle. Too heavy of a tail and the plane will stall, or gain elevation too quickly and if the nose is too heavy it will dive too quickly and lose altitude.