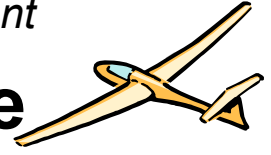


Glider Design Challenge



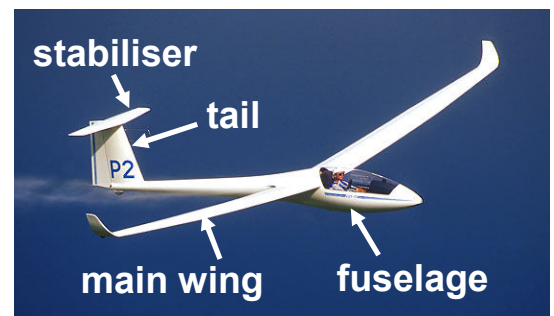
Using the foam board provided design and make a glider which travels as far as possible.

KIT LIST

- thin foam board
- thick foam board
- masking tape and sellotape
- steel rule
- ID stickers to identify your glider!
- paperclips, coins
- plasticine
- scissors, plastic knife
- sandpaper

CONSTRUCTION

1. Choose a glider design template.
Each glider needs a fuselage, wing, tail and stabiliser (except for the delta wing)



2. Cut out the fuselage, wing, tail and stabiliser from the foam using the paper templates.
- EITHER cut out the paper templates and then draw around them on to the foam OR put the paper template on top of the foam and then use a pencil or knife to score the shape onto the foam.
 - You can make the slits for the wings by scoring the foam with a pen, pencil or plastic knife OR by piercing a series of holes with a cocktail stick.

😊 **Top Tip:** If there are any rough edges around a part, smooth them using sandpaper. If possible round the leading edges and point the trailing edges.

3. Now test your fun flyer in the flying zone!

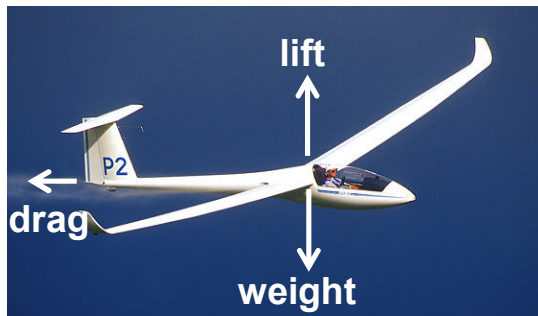
😊 **Top Tip:** Think about how hard you should throw the glider. Try throwing harder and slower.

😊 **Top Tip:** Change the angle at which you throw the glider.



Gliders must ONLY be tested in the flying zone!

AERODYNAMIC FORCES



Lift is produced mainly by the wings. The wings makes the air turn as it flows around the wing. This creates an upwards force. More *lift* can be generated in your glider by having

- larger wing area,
- higher speed
- larger *angle of attack*

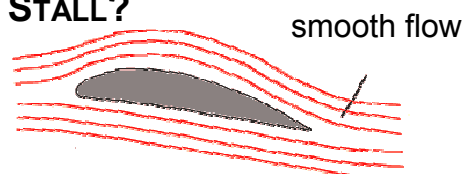
A BALANCED GLIDER IS BEST

The glider's weight must be carefully balanced before it will fly. e.g. too much weight in the front will cause the glider to dive towards the ground, not enough weight at the front causes the glider to go up steeply and then *stall*.

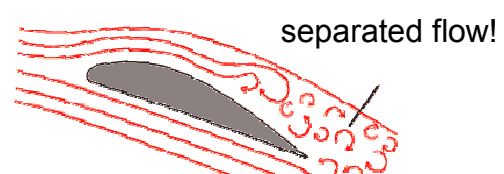
☺ **Top Tip:** Add weight to the model using paperclips, coins or plasticine.

☺ **Top Tip:** Move the weight forward or backwards on the fuselage to determine the best weight balance.

WHAT IS STALL?



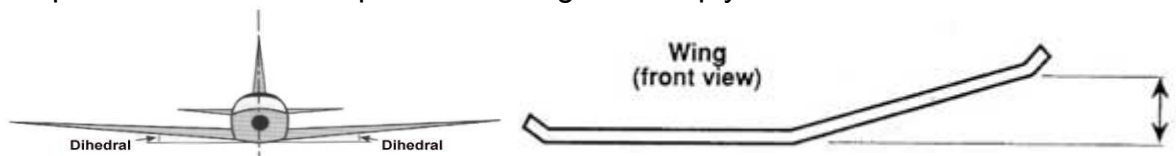
✓ Angle of attack is OK
Generates lift.



✗ Angle of attack is too big
Lift force much smaller.

☺ **Top Tip:** If your glider goes up steeply and then falls to the ground it is because the *angle of attack* becomes too large and your glider *stalls*. Try adding more weight to the front of your glider to keep the nose down and prevent it rising too steeply.

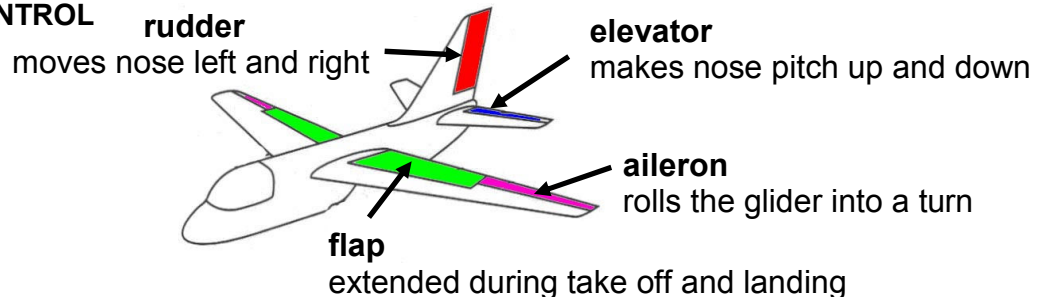
DIHEDRAL



Make the wings *dihedral* by making the outer portions of the wing angle upwards.

☺ **Top Tip:** Score the wing along the centre line and hold one half of the wing on the table and bend the opposite end up.

ADVANCED CONTROL



rudder
moves nose left and right

elevator
makes nose pitch up and down

aileron
rolls the glider into a turn

flap
extended during take off and landing

Trying making **ailerons** on your wing. These are small hinged sections which can be tilted up and down. If one aileron is up and the other down the glider feels an unbalanced force. This should make the flight path curve.

☺ **Top Tip:** Cut 2 small slits about 4-5cm apart and to make a section which can be lifted up or pushed down.

⊗ **Danger!** – You may destroy your glider making these! We suggest you make a completely new glider to investigate adding ailerons.