STEM 1: AIRCRAFT DESIGN
EXTENSION

FLIGHT CONTROL

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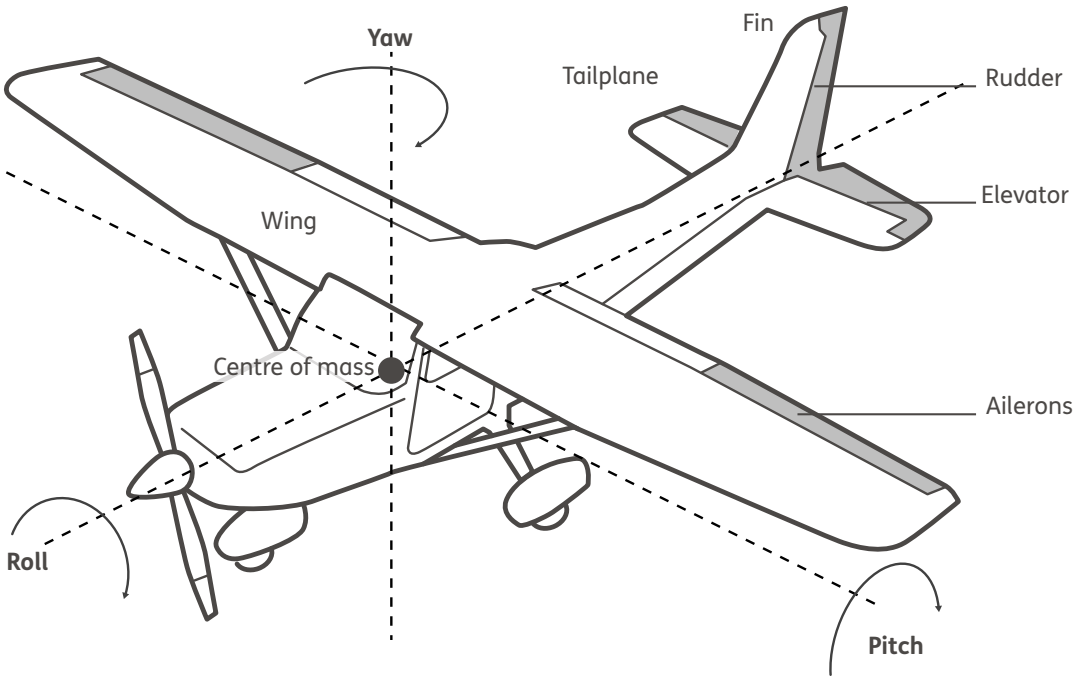
Pilots use a collection of moving flaps called control surfaces to steer an aircraft. In this activity you will make three types of control surfaces for your glider to explore how these can be used to change an aircraft's orientation.

AIRCRAFT ORIENTATION

A pilot can rotate an aircraft around three axes (shown as dotted lines). Rotation around the front-to-back axis is called roll, rotation around the side-to-side axis is called pitch and rotation around the vertical axis is called yaw.



CONTROL SURFACES

Three types of control surfaces are shown in the diagram (in grey). The control surfaces in the tailplane are called elevators. The control surfaces in the wings are called ailerons and the one in the fin is called a rudder.

WHAT YOU NEED TO DO

1. Add small tabs of sticky tape, one each side of the tailplane, to make elevators for your glider. Bend these up and see how this alters the pitch of the glider; try again with them bent down.

   Can you explain what is happening to the tail force in each case?

2. Add tabs on the back edge of each wing, near the tips to make ailerons for your glider. Turn one up a little and the other down.

   How does this alter the flight of the glider?

   What happens if you reverse the ailerons?

   Can you explain what is happening to the lift force on each wing?

3. Lastly, put one tab on the rear of the fin, so that it can be bent to one side or other.

   This tab is a rudder. It can be used at the same time as the ailerons to turn the glider.

   Experiment with using the rudder and ailerons together.

   Which way does the rudder need to point to turn the glider left?