Forces in STEM

ROYAL AIR FORCE Youth STEM

THEORY OF FLIGHT

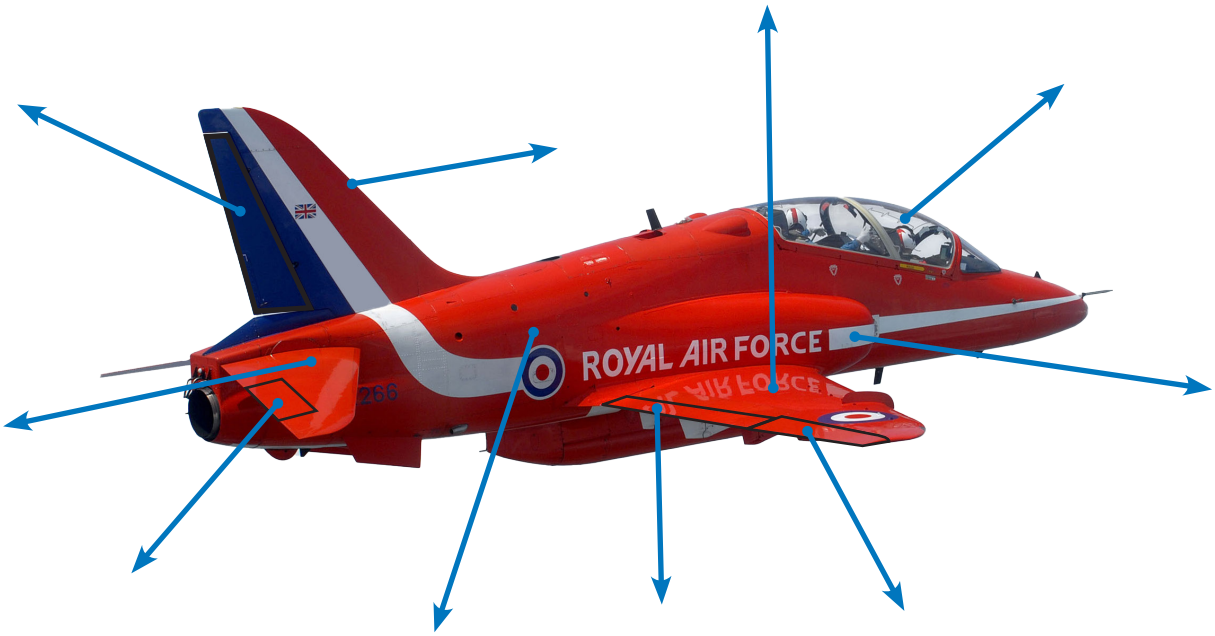
GLIDER WORKSHOP

THEORY OF FLIGHT

KEY AIRCRAFT COMPONENTS

Airplanes are made up of lots of component parts. **Use** the labels below to **name each part of the airplane** shown below:

Wing - Cockpit - Aileron - Vertical Stabiliser - Flap - Horizontal Stabiliser - Fuselage - Rudder - Elevator - Engine



DISCUSS

DISCUSS IN YOUR GROUPS WHAT TASK YOU THINK EACH OF THESE PARTS OF AN AIRCRAFT MIGHT PERFORM.

THEORY OF FLIGHT
FORCES OF FLIGHT

There are 4 forces that act on objects that fly whilst in Earth's atmosphere:

Weight is the **force of gravity.** It acts in a downward direction towards the centre of the Earth.

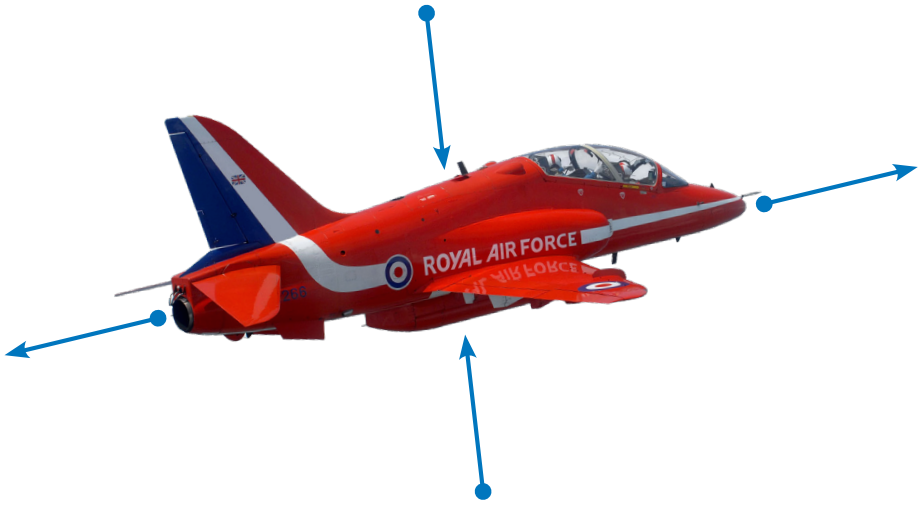
Lift is the **force that acts at a right angle to the direction of motion through the air.** Lift is created by differences in air pressure. Wings produce lift.

Thrust is the force that **propels a flying machine in the direction of motion.** Engines produce thrust.

Drag is the force that **acts opposite to the direction of motion.** Drag is caused by friction and differences in air pressure.

Label the forces acting on the aircraft below.

Weight - Lift - Drag - Thrust



CHALLENGE...

WHICH OF THESE FORCES DOES NOT EXIST IN SPACE AND WHY?

THEORY OF FLIGHT

HOW A PILOT CONTROLS AN AIRPLANE IN FLIGHT

A pilot uses many systems to fly an airplane but there are 3 movements around the airplane's centre of axis: Roll, Pitch and Yaw that control its direction in flight.

Ailerons

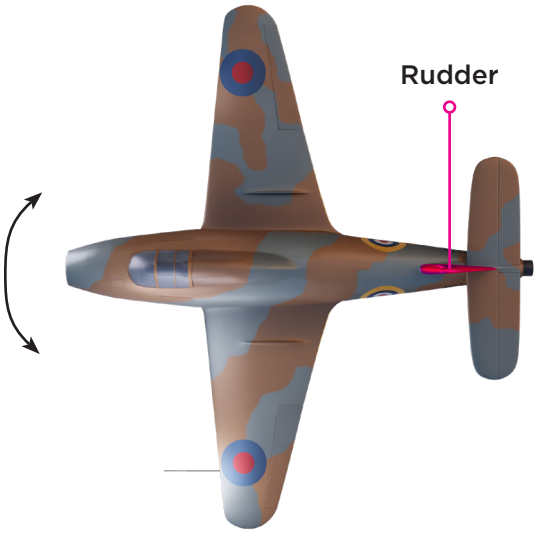
Ailerons control Roll and are normally sited on the outer rear edge of each wing. They move in opposite directions, up and down, decreasing lift on one wing while increasing it on the other. This causes the airplane to roll to the left or right. To turn the airplane, the pilot uses the ailerons to tilt the wings in the desired direction.

Elevators

Elevators control Pitch. They are located on the horizontal tail surface and tilt up or down. This decreases or increases lift on the tail. That in turn tilts the nose of the airplane up and down.

Rudder

The Rudder controls Yaw. It is located on the vertical tail fin and swivels from side to side, pushing the tail in a left or right direction. The pilot usually uses the rudder along with the ailerons to turn the airplane.



THEORY OF FLIGHT
PUT INTO PRACTICE

Using this knowledge what happens to your glider when you change the position of its rudder, aileron or elevator?

Can you use these parts to make your glider fly further, higher or straighter?

THEORY OF FLIGHT
WORDSEARCH

I	U	I	I	P	P	R	I	A	E	N	A	C	A
P	D	O	W	E	I	G	H	T	T	O	T	O	I
R	U	D	D	E	R	T	R	C	P	P	W	C	H
F	E	I	G	O	A	E	C	W	E	E	I	K	L
T	H	R	U	S	T	E	A	H	T	H	N	P	Y
T	C	L	I	A	T	L	N	S	A	D	G	I	A
G	E	R	O	T	A	V	E	L	E	A	K	T	W
I	L	L	A	I	R	P	L	A	N	E	W	E	N
L	T	D	R	A	G	I	R	C	A	T	N	G	O
I	O	T	P	R	O	L	L	N	O	I	L	C	R
I	L	E	P	L	L	T	O	O	G	I	I	O	E
G	I	U	T	C	L	O	G	N	C	E	F	F	L
E	P	T	P	D	C	A	E	N	I	R	T	R	I
L	A	A	E	G	A	L	E	S	U	F	R	E	A

TAIL
ENGINE
WEIGHT
THRUST
AIRPLANE
ELEVATOR
AILERON
PITCH
FUSELAGE
WING
COCKPIT
ROLL
PILOT
YAW
DRAG
LIFT
RUDDER

AVIATOR!

CAN YOU FIND ALL OF THE WORDS LISTED WITHIN THE WORDSEARCH?