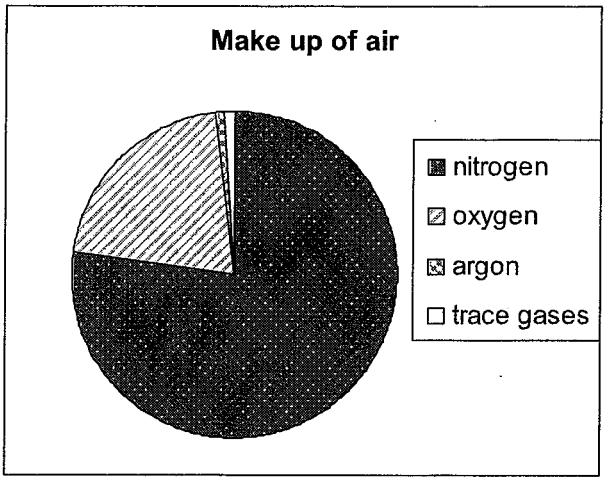
Air and Aerodynamics Study guide

Air – the air we breathe is made of different gases

Gas	Percent in Air
Nitrogen	78 %
Oxygen	21 %
Other trace gases	1%



Oxygen is necessary for all living things.
Oxygen and water react with metal to cause Rust.
Oxygen is necessary for burning to occur.

Air exists because:

- It takes up space
- It has volume
- It has weight
- It has pressure

Air takes up space

- Run a garbage bag through the air- it fills with air = air takes up the space in the bag
- Put a cup upside down in water. The cup will not fill with water because air is taking the space up in the cup. You must let the air out (by tipping the cup) in order for water to fill up the space.

Air has volume

- You can measure the volume of air in a room- take the measurements of the room (length X width X height). This will equal the volume of air in the room.

Air has weight

- tie two equal size balloons on the ends of a stick. Balance them. Pop one balloon. The other balloon filled with air will fall towards the ground because it has weight.

Air has pressure

- air pressure increases the closer you are to sea level
- air pressure decreases as you go up a mountain.

Air	Higher or Lower Pressure
Cold air	higher
Warm air	lower
Still air	higher
Moving air	lower

Newton's Third Las of Motion

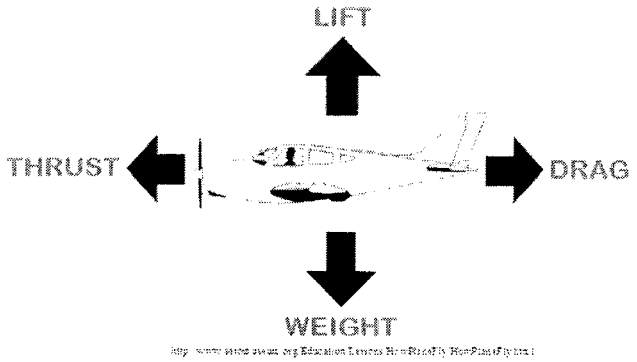
For every action, there is an equal and opposite reaction.

Bernoulli's Principle – faster flowing fluids (gases and liquids) have lower pressure than slower flowing fluids.

Forces in Flight

Lift- upward force
Gravity- downward force
Drag- backwards force
Thrust- forward force

Force	Opposite force	Greater force = What happens
lift	gravity	Lift is greater = plane will go up Gravity is greater = plane will go down
thrust	drag	Thrust is greater = plane will speed up Drag is greater = plane will slow down



Aaptations for flight

Birds

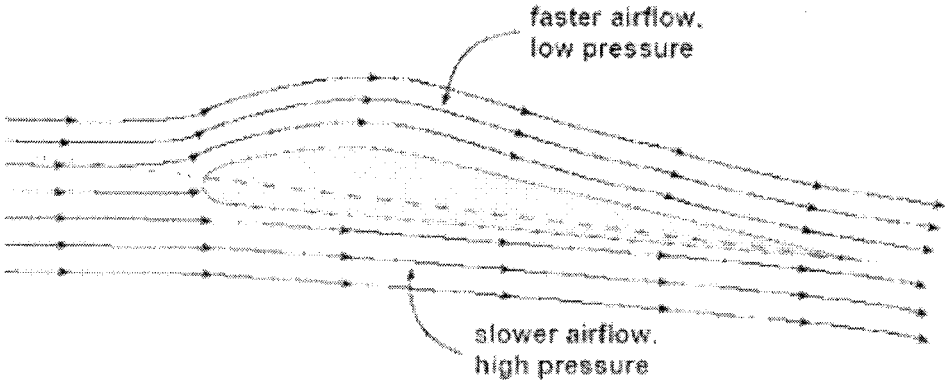
- Have hollow bones that make them lightweight but strong.
- Have feathers
- Have strong pectoral muscles that allow them to flap their wings
- Wings shaped like an airfoil
- Aerodynamic shape
- Primary and secondary feathers each have a role in flight. Primaries allow the bird to manoeuvre in the air. Secondary feathers catch air.

Insects

- Light weight and small
- May have one or two sets of wings
- Have strong pectoral muscles that allow them to move their wings

- Wings shaped like an airfoil
- Aerodynamic shape
- Wings are very thin with a network of veins. Veins make the wings very strong.

Air flow over and under wing creating lift



Air and water are necessary for iron to rust.

Air is necessary for fire to burn.