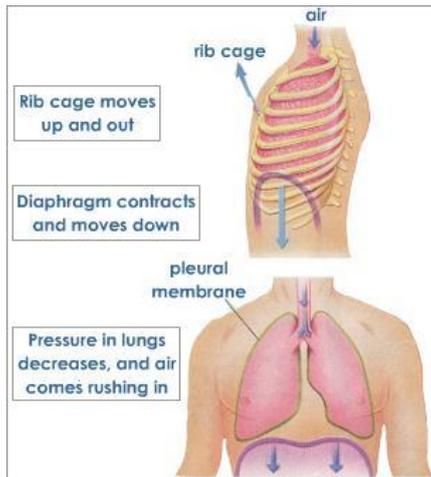


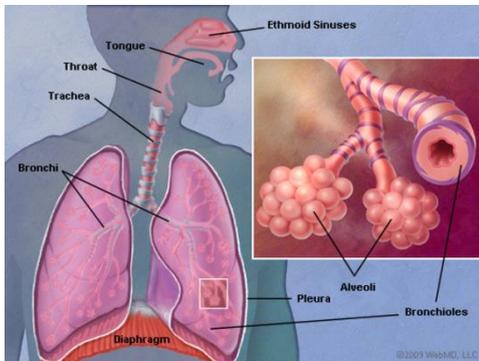
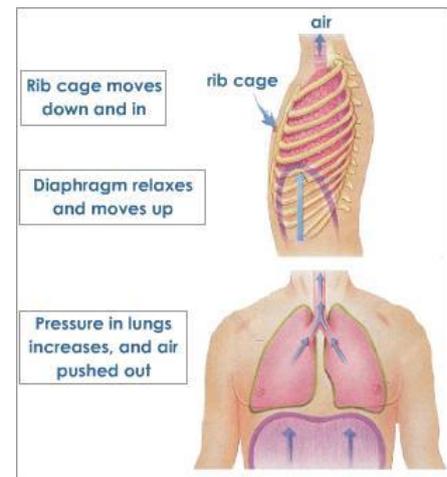
Organisms and Organ systems

Breathing is how mammals get air into and out of the lungs (it is not the same as respiration = getting energy from glucose sugar)

Inhaling:



Exhaling:



Air moves from mouth through the trachea, into the bronchi, down the bronchioles and into the alveoli.

Lungs have many air sacs in them called alveoli, these are moist, very thin, have a very large surface area and are surrounded by blood capillaries so that oxygen can diffuse (move) quickly and easily from lungs to blood and carbon dioxide can diffuse from blood to lungs = this is gas

exchange. The structure can be damaged by smoking.

How fast you breathe (breathing rate) depends on how much oxygen your body needs at any one time. When you exercise your cells need more oxygen (for respiration) and so your breathing rate increases. Lung volume can also be measure, this tells us how much air has been inhaled or exhaled; it is often easiest to measure by breathing out as much as you can.

Diet: a balanced diet is when you eat a wide range of food types in the correct proportions.

There are **5 food groups**:

Carbohydrates (sugar and starch)– required for energy (contained in pasta, bread, rice, potatoes, fruit and vegetables etc)

Protein – required for growth and repair of cells (contained in meat, beans, pulses dairy etc)

Lipids (fats and oils) – required for energy and insulation (contained in dairy, meat etc)

Fibre - required for keeping gut muscles strong (contained in whole wheats and vegetables)

Vitamins and minerals - required for keeping the body healthy and working correctly (in fruit and vegetables)

If you eat more food than you need for your energy requirements your body will store the extra food as fat. Obesity is a form of malnutrition that is the results of eating more than your body requires. If you do not eat enough, you will lose weight – this is also malnutrition.

Obesity results in: Heart failure; pressure on joints; type 2 diabetes; high blood pressure;

Starvation results in: Muscle loss; low blood pressure; constipation; fatigue

Deficiency diseases are a due to a lack of a certain vitamin or mineral in the diet:

Deficiency disease	Caused by lack of	Found in	Symptoms
Anaemia	iron	Red meat, green vegetables	Pale gums/skin; tiredness; short of breath (needed for red blood cells to carry oxygen)
Scurvy	Vitamin C	Citrus fruit	Weakness; gum disease
Rickets	Vitamin D	Fish, milk (need exposure to sunlight to absorb it from food)	Bone pain and weakness
hypocalcemia	calcium	Milk and other dairy	Muscle cramps, weak bones and teeth

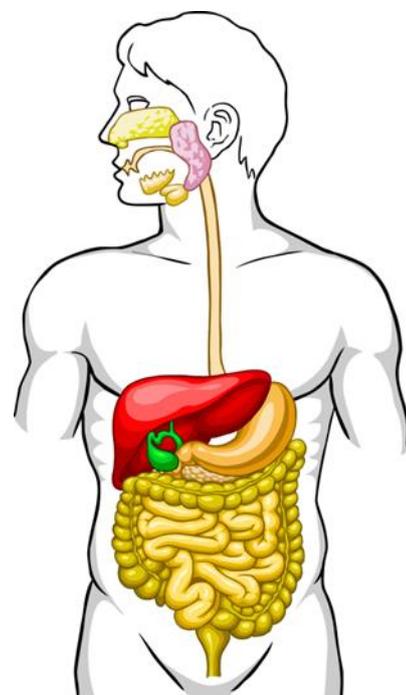
Digestion starts in the mouth where teeth physically break down food and salivary enzymes chemically break down carbohydrates.

The stomach contains acid which kills harmful bacteria and provides the right conditions for some enzymes to digest protein.

Inside the small intestine food is digested (broken down into smaller molecules) by enzymes and then absorbed into the blood stream.

Bacteria are found in the digestive system that aid in breaking down food and also help to stop harmful bacteria living in your gut.

Different food types are broken down (digested) by different enzymes



Enzyme	food	Where the enzyme acts
amylase (carbohydrase)	starch (carbohydrate)	Mouth and small intestine
protease	proteins	Stomach and small intestine
lipase	fats	Small intestine

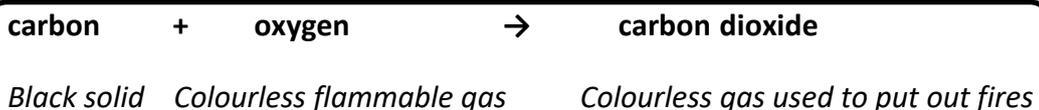
Periodic Table

The periodic table is a list of all the elements in the universe. **Elements** are made up of one type of atom only eg gold atoms, hydrogen atoms. They can be joined in molecules eg H₂

Each element has it's own symbol which is either

- one capital letter eg H for hydrogen
- or has 2 letters, the first is capital the second is lower case eg Na for sodium

Elements react together to form compounds which will have different *properties* to the elements they are made from eg



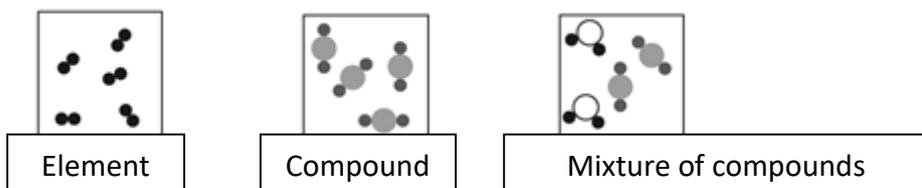
*This is a word equation
(reactants before the
arrow, products after the
arrow)*

Compounds are 2 or more different elements chemically bonded / joined.

Compounds have a formula which tells us the ratio of elements it contains.

eg CaCO₃ contains 1 calcium atom, 1 carbon atom and 3 oxygen atoms

A **mixture** is different elements or compounds **not** joined together.



Naming compounds:

2 elements joined together end in 'ide'

eg: CO = carbon monoxide

CO₂ = carbon dioxide

NaS = sodium sulphide

a compound ending in 'ate' contains oxygen and 2 other elements

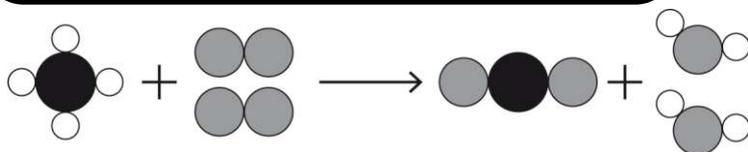
eg: CaCO₃ = calcium carbonate

ZnSO₄ = zinc sulfate

A compound ending in 'OH' is called a hydroxide

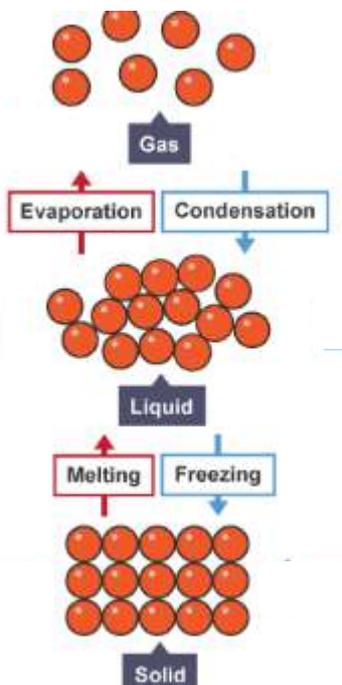
eg: LiOH = lithium hydroxide

KOH = potassium hydroxide



Chemical changes happen when elements and compounds **react** to break apart and join together. During chemical reactions you may see:

Change in colour ; gas released ; heat produced (maybe a flame)



Elements and compounds can exist in different physical states called 'states of matter'

These are solid, liquid and gas.

Changing state is a **physical change** and is reversible by change of temperature

The periodic table is organised into periods (rows) and groups (columns).

The groups contain elements with *similar chemical properties*.

Group 1 are known as the alkali metals – their reactivity increases you go down the group. Their melting and boiling points decrease as you go down the group.

Group 7 are known as the halogens – they are non-metals with reactivity that decreases down the group. Their melting and boiling points increase as you go down the group.

Group 0 are known as the noble gases and are completely unreactive non-metal gases.

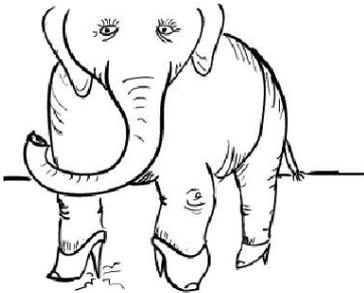
Metallic elements are found on the left of the zigzag line in the periodic table, non-metals are found to the right.

1		2												3	4	5	6	7	0	
				H 1																He 2
3 Li	4 Be											5 B	6 C	7 N	8 O	9 F	10 Ne			
11 Na	12 Mg											13 Al	14 Si	15 P	16 S	17 Cl	18 Ar			
19 K	20 Ca	21 Sc	22 Ti	23 V	24 Cr	25 Mn	26 Fe	27 Co	28 Ni	29 Cu	30 Zn	31 Ga	32 Ge	33 As	34 Se	35 Br	36 Kr			
37 Rb	38 Sr	39 Y	40 Zr	41 Nb	42 Mo	43 Tc	44 Ru	45 Rh	46 Pd	47 Ag	48 Cd	49 In	50 Sn	51 Sb	52 Te	53 I	54 Xe			
55 Cs	56 Ba	57 La	72 Hf	73 Ta	74 W	75 Re	76 Os	77 Ir	78 Pt	79 Au	80 Hg	81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn			
(87) Fr	(88) Ra	(89) Ac											81 Tl	82 Pb	83 Bi	84 Po	85 At	86 Rn		

- Polymers are big molecules. They are made up from long chains of small repeating units, each called a monomer. Chemical reactions occur to make the molecules bond together. Sometimes heat, pressure and / or a catalyst are used to help the reactions occur. Many natural polymers are found in our bodies; these include DNA and protein. Other natural polymers are found in plants; these include cellulose, starch and cotton. Plastics are a man made polymer.

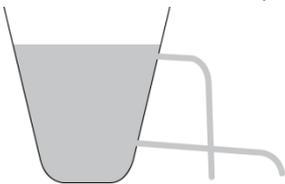
Forces

- Contact forces occur when objects are touching eg friction, drag, tension
- Non-contact forces act on object not touching eg gravity
- When accelerating the forward forces are bigger than the backward forces
- When slowing down the backward forces are bigger than the forward forces
- When moving at a constant speed the forward forces are equal to the backward forces: they are balanced



- Pressure (Pascals or N/m^2) can be calculated by weight divided by area
- A 55kg lady in high heels will put more pressure on a wooden floor than an 550kg elephant would because the force is acting on a smaller area. Wearing heels would make you sink into mud more than a pair of large bottomed shoes!!
- Elephants in high heel??? Lots of pressure!
- You can lie on a bed of nails as your weight is evenly distributed over lots of nail surface area, but if you stand on a nail you will put all your weight on one small surface area and the pressure would increase and the nail would go through your foot – don't do it!

- Pressure in liquids : Pressure acts in all directions in a fluid
- The greater the depth the greater the pressure exerted from water above.
-



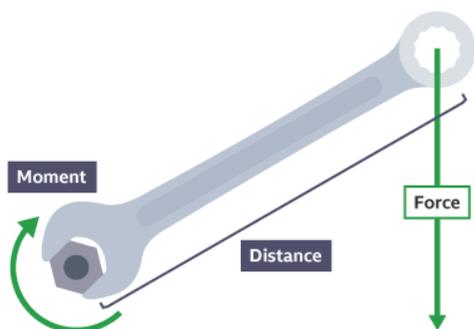
Levers

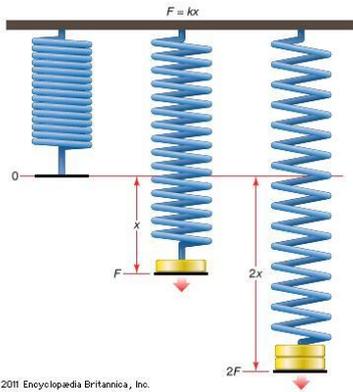
A moment is the turning effect of a force. Forces that create a moment act around a point called the pivot. The pivot is the point around which the object can rotate or turn.

On a seesaw the pivot is the point in the middle.

It makes calculations easier to try to measure the perpendicular distance between the line of action of the force and the pivot.

For example, if you apply a force to a spanner it rotates. The pivot is at the bolt.

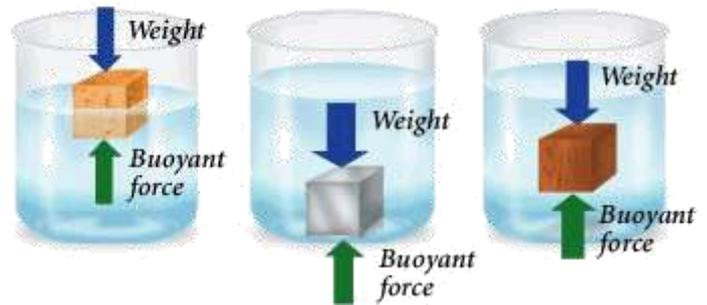




© 2011 Encyclopædia Britannica, Inc.

- **Hooke's law** : As even masses are added to a spring the spring will stretch in even amounts. The amount of extension is in a linear relationship with the force used.

Buoyancy



- **Floating and sinking:**
- If the force of weight is bigger than the force of upthrust the object will sink
- If the force of weight is balanced by the force of upthrust the object will float
- We can measure upthrust by lowering an object into water and measuring the volume of water displaced. The weight of the displaced water is the same as the size of the upthrust force.