



## Key Knowledge Year 7

## 7B1 Cells, tissues, organs & systems



### Life processes

- All living things have 7 life processes (MRS GREN)
- M = Movement
- R = Reproduction
- S = Sensitivity
- G = Growth
- R = Respiration
- E = Excretion
- N = Nutrition

### Function of cell parts

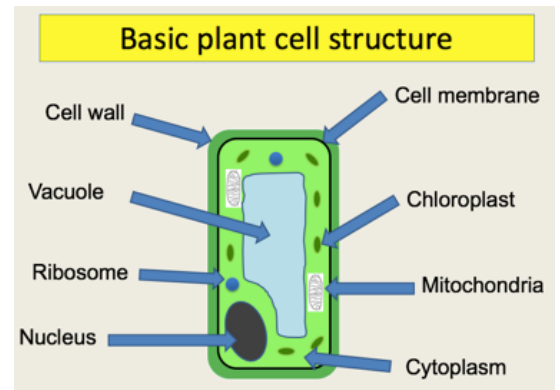
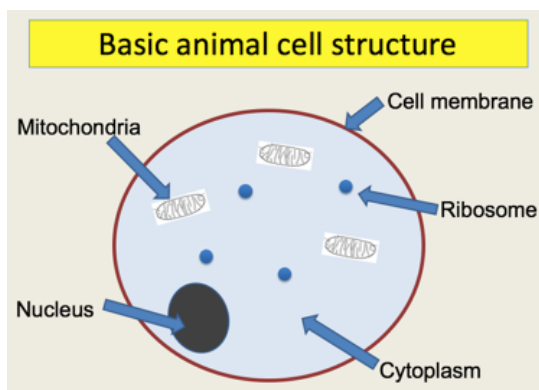
- Nucleus – controls the cell, contains DNA
- Cell membrane – allows substances in and out
- Cell wall – shape, structure, support
- Mitochondria – respiration
- Ribosomes – make protein
- Vacuole (plant only) – stores water and sap
- Chloroplast (plant only) – absorbs sunlight energy for photosynthesis
- Cytoplasm – liquid that fills the cell, chemical reactions occur here

### Tissues, organs, organ systems

- A tissue is a group of cells working together Eg. Muscle tissue, xylem tissue
- An organ is a group of tissues working together Eg. Heart, stomach, leaf
- An organ system is a collection of organs working together Eg. Digestive system

### Magnification

- Magnification = eyepiece lens x objective lens





## Key Knowledge Year 7

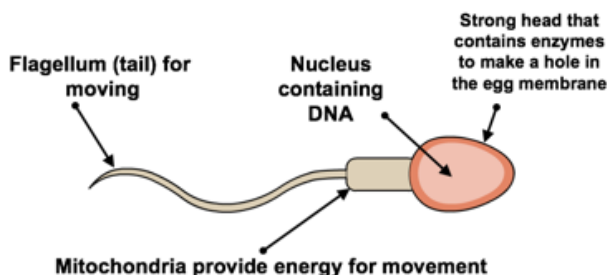
## 7B2 Sexual Reproduction



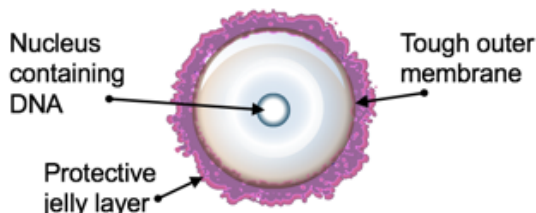
### Gametes

- Gametes are sex cells
- Male gamete → sperm. Made in the testes
- Female gamete → egg. Made in the ovary

### Adaptations of a sperm cell



### Adaptations of an egg cell



### Sexual organs

- Male → penis
- Female → vagina

### Fertilisation

- Fertilisation occurs when a sperm cell fuses with an egg cell
- This happens in the oviduct
- Once sperm and egg have joined, the resulting cell is called a zygote
- The zygote multiplies to form a ball of cells called an embryo
- The embryo implants in the wall of the uterus
- This grows and becomes a foetus

### Pregnancy & Birth

- Pregnancy in humans lasts for 40 weeks
- Oxygen and nutrients are passed into the foetus through the umbilical cord and placenta
- Carbon dioxide and waste products are removed from the foetus through the umbilical cord and placenta



## Key Knowledge Year 7

## 7B3 Muscles & Bones



### Muscles

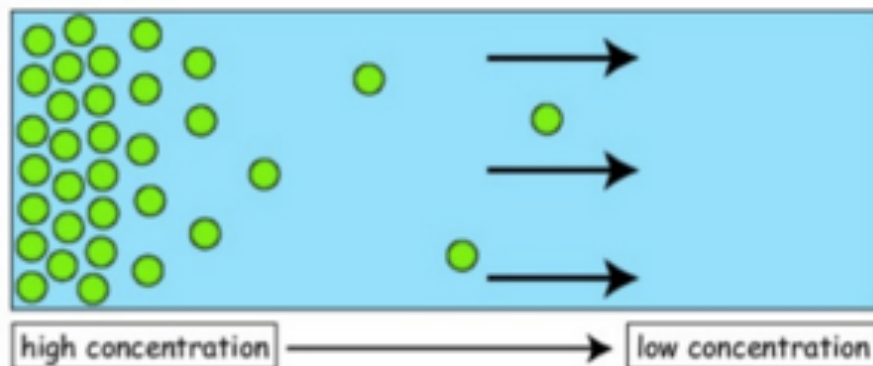
- Can only pull
- Work in antagonistic pairs eg. biceps and triceps
- Tendons attach muscles to bones

### The skeleton

- The four functions of the skeleton are support, protection, storage and movement

### The lungs and breathing

- The lungs have a large surface area
  - The diaphragm is a muscle under the lungs
  - When the diaphragm contracts we inhale
  - When the diaphragm relaxes we exhale
  - Gases are exchanged in the lungs by diffusion
- 
- Diffusion is the movement of particles from a high concentration to a low concentration



### The heart

- The heart is made of cardiac muscle
- The heart has four chambers

### The blood

- Red blood cells carry oxygen
- White blood cells fight pathogens (germs)
- Platelets causes clots
- Plasma is the liquid part of the blood



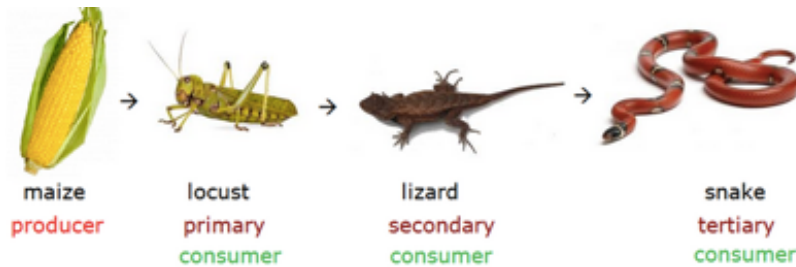
## Key Knowledge Year 7

## 7B4 Ecosystems



### Food chains

- Always start with a producer which makes its own food by photosynthesis
- Producer → primary consumer → secondary consumer → tertiary consumer



### Species

- A species is a group of living things that can interbreed (have babies)

### Biodiversity

- Biodiversity is the amount of different species living in a habitat

### Sampling techniques - Quadrats

- Quadrat – hollow square frame
- Place randomly in the area you wish to sample
- Count up the number of organisms
- Repeat many times and find the average
- Multiply the average by the number of quadrats that will fit into the area





## Key Knowledge Year 7

## 7B5 Food & Nutrition

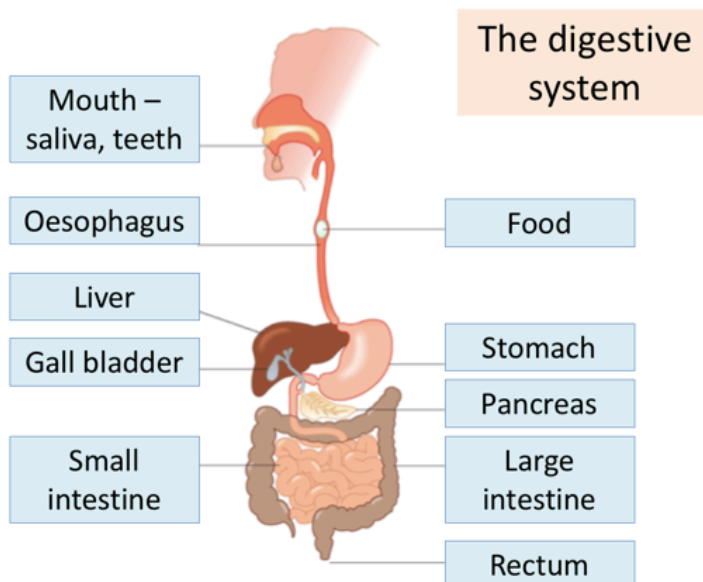


### Seven food groups

- Carbohydrate – used for energy
- Protein
- Fats
- Vitamins
- Minerals
- Fibre
- Water

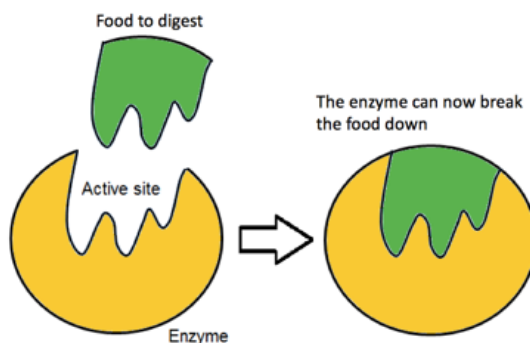
### Digestive system

- Digestion is breaking large insoluble molecules into smaller, soluble ones
- The stomach contains hydrochloric acid which kills germs
- The liver produces bile
- Bile helps digest fats
- The small intestine absorbs nutrients into the blood



### Enzymes

- Enzymes speed up reactions
- Enzymes work by the lock and key method





## Key Knowledge Year 7

## 7C1 Atoms, Elements & Particles



### Atoms, elements, molecules, compound

- Atoms make up everything
- An element is made up of only one type of atom
- A molecule is made up of two or more atoms
- A compound is made up of two or more different atoms
- A mixture is a group of chemicals not bonded together



Atom  
Element



Elements  
Molecules



Compound



Mixture

### The Periodic Table

- All elements have their own symbol eg. H is hydrogen, Na is sodium
- Metals are on the left and in the middle
- Non-metals are on the right

### Solid, liquid and gas particle diagrams and properties

Solid	Liquid	Gas
Cannot be compressed	Cannot be compressed	Can be compressed
Fixed shape	Takes shape of container	Takes shape of container
Doesn't flow	Flows	Flows
High density	Quite high density	Low density



## Key Knowledge Year 7

## 7C2 Mixtures & Separation



### Key words

- A solute is a substance that dissolves in water eg. salt
- A solvent is a substance that dissolves other things eg. water
- A solution is a solute dissolved in a solvent eg. salty water
- Insoluble substances do not dissolve in water eg. sand
- Soluble substances do dissolve in water eg. salt
- A mixture is a group of chemicals not bonded together eg. air

### Separating methods

- Filtration is used to separate insoluble substances from a liquid
- Evaporation is used to separate a liquid from a solid
- Distillation is used to separate liquids with different boiling points
- Chromatography is used to separate dyes of different solubility

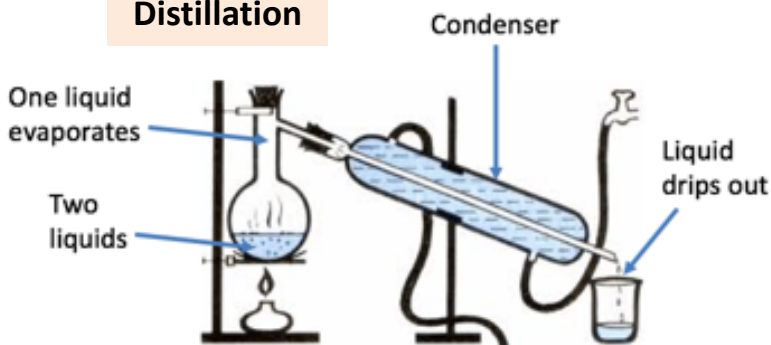


Filtration

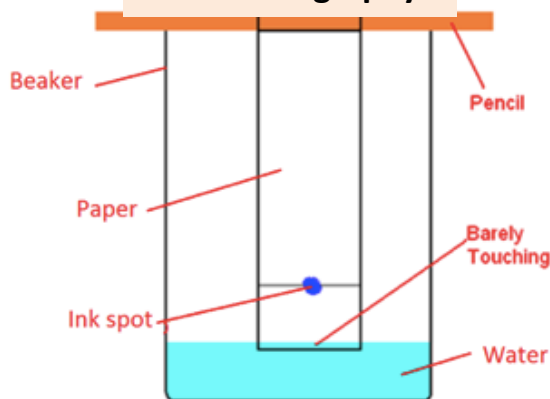


Evaporation

Distillation



Chromatography







## Key Knowledge Year 7

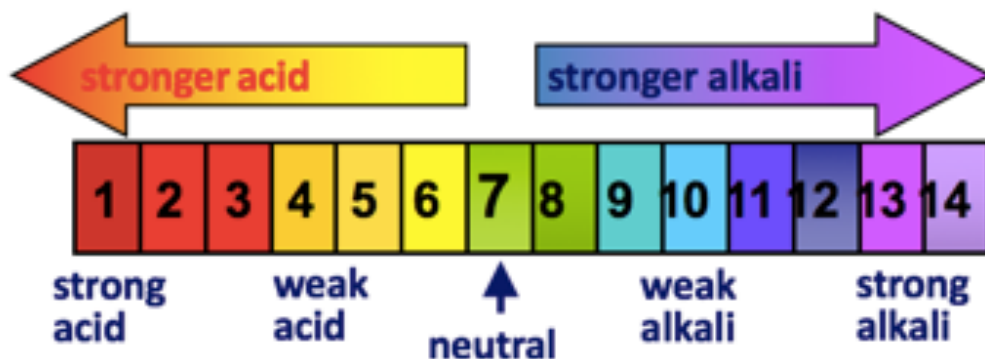
## 7C3 Acids & Alkalis



### pH scale

- 1 to 6 is acid
- 7 is neutral
- 8 to 14 is alkali

### Universal indicator colours



### Key equation

- Acid + alkali  $\rightarrow$  salt + water

### Common acids

- Hydrochloric acid
- Sulfuric acid
- Nitric acid

### Common alkalis

- Sodium hydroxide
- Magnesium hydroxide
- Calcium hydroxide

### Naming salts

- Hydrochloric acid makes metal chlorides  
Hydrochloric acid + sodium hydroxide  $\rightarrow$  sodium chloride + water
- Sulfuric acid makes metal sulfides  
Sulfuric acid + magnesium hydroxide  $\rightarrow$  magnesium sulfate + water
- Nitric acid makes metal nitrates  
Nitric acid + calcium hydroxide  $\rightarrow$  calcium nitrate + water

### Bases and alkalis

- A base is a substance that neutralises an acid
- An alkali is a soluble base (dissolves in water)





## Key Knowledge Year 7

## 7C4 Rates of Reaction



### Reversible + irreversible reactions

- Reversible reactions can be changed back eg. melting ice
- Reversible reactions are physical changes
- Irreversible reactions cannot be changed back eg. cooking an egg
- Irreversible reactions are chemical changes

### Particles and reactions

- Particles are always moving
- They collide
- If they collide with enough energy there will be a reaction

### Rate of reaction

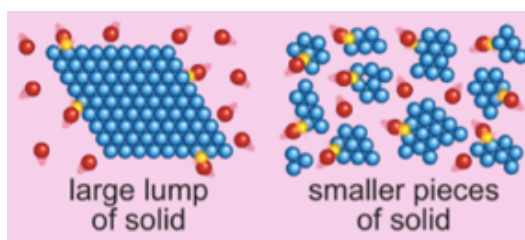
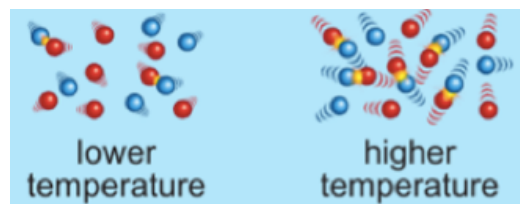
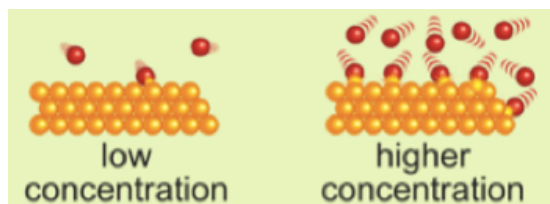
- Rate of reaction is how fast the reaction goes in a set amount of time

### Factors that affect rate of reaction

- Surface area of the chemicals. A larger surface area = faster reaction
- Concentration of chemicals. Higher concentration = faster reaction
- Temperature of chemicals. Higher temperature = faster reaction
- Catalysts speed up a reaction

### Variables

- Independent variable – this is what you change
- Dependent variable – this is what you measure
- Control variable – this is what you keep the same





## Key Knowledge Year 7

## 7P1 Energy



### Conservation of energy

- Energy cannot be created or destroyed, only transferred from one form to another

### Nine types of energy

- Thermal / heat
- Light
- Sound
- Chemical – all fuels contain chemical energy
- Kinetic – things moving
- Gravitational potential
- Elastic potential
- Nuclear
- Electrical

### Fuels

- A fuel is a substance that is burned to release energy
- Energy is measured in joules (J)

### Renewable energy

- Renewable energy sources will not run out
- Solar, wind, wave, hydroelectricity, tidal, geothermal, biomass

### Non-renewable energy

- Non-renewable energy sources will run out
- Fossil fuels – coal, oil, gas
- Nuclear



## Key Knowledge Year 7

## 7P2 Electricity



### Current

- Current is the flow of electrons
- Current is measured in amps (A)
- Current is measured with an ammeter

### Voltage

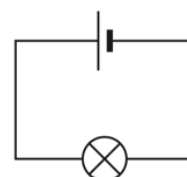
- Voltage is the push given to the electrons by a battery
- Voltage is measured in volts (V)
- Voltage is measured with a voltmeter

### Resistance

- Resistance means how hard it is for the current to flow
- Resistance is measured in ohms ( $\Omega$ )

### Series circuits

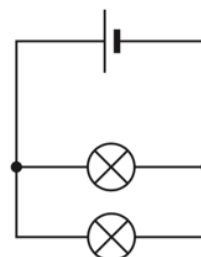
- Current is the same at all points
- Voltage is shared by the parts of the circuit



Series

### Parallel circuits

- Current splits at a junction
- Voltage is the same across all parts of the circuit

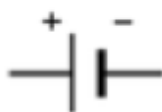


Parallel

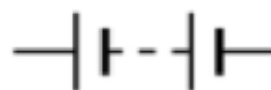
### Circuit symbols



Lamp (bulb)



Cell



Battery



Ammeter



Voltmeter



Switch



## Key Knowledge Year 7

## 7P3 Forces



### Forces

- Force is measured in newtons (N)
- A force can change an object's shape, speed or direction

### Contact Forces

- Objects need to be touching to feel a force
- Friction
- Upthrust
- Air resistance

### Non-contact Forces

- Objects do not need to be touching to feel a force
- Gravity
- Electrostatic
- Magnetism

### Balanced forces

- Forces acting in opposite directions are the same



### Non-balanced forces

- Forces acting in opposite directions are not the same
- The object will move in the direction of the largest force



- The overall force is called the resultant force



## Key Knowledge Year 7

## 7P4 Light & Sound



### Waves

- Waves transfer energy

### Light

- Light is transverse wave
- Light travels straight lines
- Light travels faster than sound

### The law of reflection

- Angle of incidence = angle of reflection

### Refraction

- Refraction means light waves changing direction
- This is because light waves travel at different speeds in different objects eg. air, water, glass

### Sound

- Sound is a longitudinal wave
- Sound is caused by vibrations
- Sound is slower than light
- Sound reflections are called echoes

### Speed

- The speed of a wave is how fast the wave is moving
- Speed is calculated with this equation:

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

### Units

- Speed = metres per second (m/s)
- Distance = metres (m)
- Time = seconds (s)