BIOLOGY

In Y10 cycle 1 of your Biology lessons you will focus on the key concept of Eukaryotic cells, Prokaryotic cells and Cell division which builds on previous knowledge from Y9 of cells and cell structures.

Nucleus	Organelle found in many living cells, containing the genetic information.		**Differentiation**	When a cell becomes a specialised cell
Cytoplasm	A water based cell in which the organelles of all living cells are found. Most chemical reactions take place here.		**Mitosis**	Cell division where one set of chromosomes are pulled to each end of the cell and the nucleus divides forming two identical daughter cells.
Cell membrane	The membrane around the contents of the cell that controls what moves in and out of the cell.		**Stem cell**	Cells that are undifferentiated but can turn into any type of cell
Mitochondria	The place where aerobic respiration takes place in a cell.		**Cell cycle**	Three- stage process of cell division in a body cell that involves mitosis and results in the formation of two identical cells
Ribosomes	The place where protein synthesis takes place.		**Cloning**	The production of identical offspring by asexual reproduction.
Cell wall	The rigid structure around plant and algal cells. It is made of cellulose and strengthens the cell.		**Zygote**	The single new cell formed by the fusion of gametes in sexual reproduction.
Cellulose	The complex carbohydrate that strengthens cell walls.		**Embryonic stem cell**	Stem cells from an early embryo that can differentiate to form the specialised cells of the body.
Chlorophyll	The green pigment found in chloroplasts. It is needed for photosynthesis.		**Adult stem cell**	Stem cells from an adult that can differentiate to form the specialised cells of the body.
Permanent vacuole	Space in the cytoplasm that is filled with cell sap.		**Therapeutic cloning**	A process where an embryo is produced that is genetically identical to the parent so that cells can then be used in medical treatments.
Eukaryotic cells	Cells from eukaryotes that have a cell membrane, cytoplasm, and genetic material enclosed in a nucleus.		**Gene**	A part of a chromosome that determine a characteristic of the organism.
Prokaryotic cells	e.g bacteria. Cells without a nucleus, mitochondria or chloroplasts.		**Chromosome**	A thread-like structure made of proteins that is found in the nucleus of most living cells, carrying genetic information in the form of genes.
Sperm cell	The male sex cells or gametes that carry genetic material from the male parent.			
Roots hair cell	Plant cell where water is absorbed from the soil.			

Required practical:

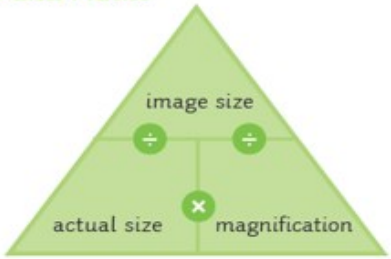
Microscopy:

Includes drawing a slide, using a light microscope, drawing any observations – use a pencil and label important observations.

Stains- used to make parts of the cell visable

Equations and Maths

Equation



Maths Skills

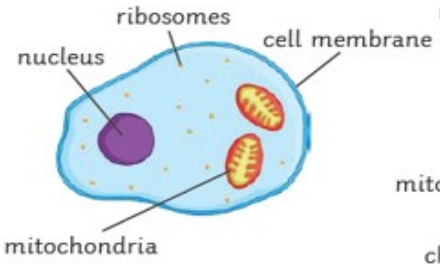
Conversions:
Micrometres to millimetres: divide by 1000.

Standard Form:
$0.003 = 3 \times 10^{-3}$

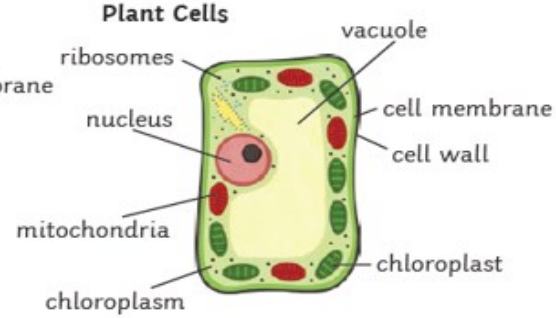
$5.6 \times 10^{-5} = 0.0056$

Prokaryotic and Eukaryotic Cells

Animal Cells

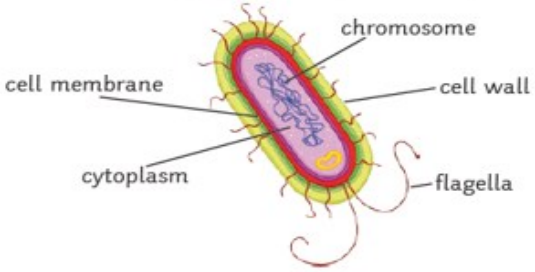


Plant Cells

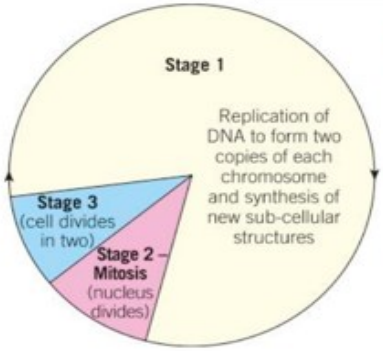


Bacterial Cells

Bacterial cells do not have a true nucleus, they just have a single strand of DNA that floats in the cytoplasm. They contain a plasmid.



The cell cycle



Process by which body cells divide. Three stages:

1. Copy: Two copies of chromosomes and internal cell structures
2. Mitosis: Copies of chromosomes move and form two nuclei
3. Split: cytoplasm and cell membranes split to make two identical cells

In cycle 1 of your chemistry lessons you will focus describing the differences in bonding and properties of giant ionic structures, simple covalent molecules, and giant covalent structures (including different arrangements of carbon). This topic builds on your knowledge of elements and compounds from year 9.

Key word	Definition		Key word	Definition
States of matter	All things are classified into three states of matter – solids, liquids and gases.		**Giant lattice**	A huge 3D network of ions or atoms.
Solid	A state where particles are touching in a regular pattern and can only vibrate on the spot. It cannot be compressed and it cannot flow.		**Intermolecular forces**	The attraction between the individual molecules in a covalently bonded substance.
Liquid	A state where particles are touching but can slide past each other. It can flow but cannot be compressed.		**Polymers**	Very large molecules made from many smaller molecules called monomers
Gas	A state where particles are free to move. It can flow and can also be compressed.		**Giant covalent structures**	A huge 3D network of covalently bonded atoms.
Particle theory	The theory that describes all forms of matter as being made of tiny particles.		**Graphite**	A structure where carbon atoms are joined together and arranged in layers. The links between the carbon atoms in the layer are strong, but the links between the layers are weak.
Covalent bonding	The attraction between two atoms that share one or more pairs of electrons.		**Delocalised electrons**	Bonding electron that is no longer associated with any one particular atom.
Ionic bonding	The electrostatic force of attraction between positively and negatively charged ions.		**Fullerenes**	From of the element carbon that can exist as large cage-like structures, based on hexagonal rings of carbon atoms.
Dot and cross diagrams	A drawing to show only the arrangement of the outer shell electrons of the atom or ion in a substance.		**Graphene**	A form of carbon consisting of sheets which are one atom thick, with the atoms arranged in a honeycomb-shaped lattice.
States of matter	All things are classified into three states of matter – solids, liquids and gases.		**Metallic bonding**	Bonds that are between metals and are strong meaning they need lot of energy is needed to break them.

Bonding structure and properties

In cycle 1 of your physics lessons you will focus on measuring and using energy. This builds on previous knowledge of energy stores from year 9.

Key word	Definition
Energy transfer	The conversion of one form of energy into another, or the movement of energy from one place to another.
Chemical energy	Energy stored in the bonds of chemical compounds (atoms and molecules). It is released in a chemical reaction. Batteries, biomass, petroleum, natural gas, and coal are examples of stored chemical energy.
Kinetic energy	The energy of motion/movement, it can be seen as the movement of an object, particle, or set of particles.
Gravitational potential energy	Energy an object possesses because of its position in a gravitational field.
Elastic potential energy	Energy is potential energy stored as a result of deformation of an elastic object, such as the stretching of a spring.
Thermal energy	Heat energy, the internal energy of an object due to the kinetic energy of its atoms and/or molecules.
Conservation of energy	Energy cannot be created or destroyed.
Work	The energy transferred by a force. Work done (J) = Force (N) x distance moved in the direction of the force (m).
Friction	The force opposing the motion of two solid surfaces in contact.
Gravitational field strength	The force of gravity on an object of mass 1kg in N/kg (Newton's per kilogram). It is also the acceleration of a free falling object.
Dissipation of energy	The energy that is not usefully transferred is stored in less useful ways.
Useful energy	Energy transferred to where it is wanted in a way that is wanted.
Wasted energy	Energy that is not usefully transferred.
Efficiency	Useful energy transferred by a device ÷ total energy supplied to the device.
Power	The energy transformed or transferred per second. Unit of power is the watt (W).

Equations

$E = \frac{1}{2}mv^2$

$E_p = mgh$

$E_e = \frac{1}{2}ke^2$

$P = \frac{E}{t}$

$P = \frac{W}{t}$

Energy

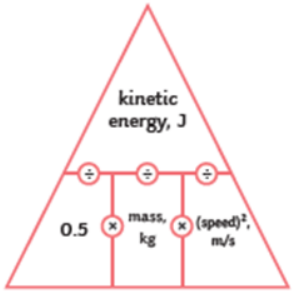
Kinetic and Potential Energy Stores

Movement Energy

kinetic energy = $\frac{1}{2}$ x mass × speed^2

$$E_k = \frac{1}{2}mv^2$$

(J) (kg)(m/s)

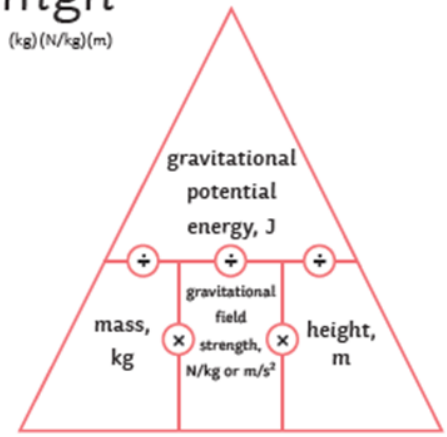


When something is off the ground, it has gravitational potential energy

gravitational potential energy = mass x gravitational field strength x height

$$E_p = mgh$$

(J) (kg)(N/kg)(m)



When an object falls, it loses gravitational potential energy and gains kinetic energy.

Stretching an object will give it elastic potential energy.

elastic potential energy = $\frac{1}{2}$ × spring constant × extension^2

$$E_e = \frac{1}{2}ke^2$$

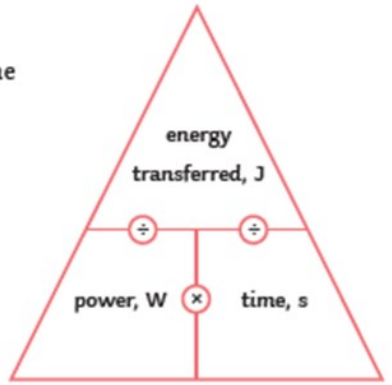
(J) (N)(m)

Power

Power is the rate of transfer of energy – the amount of work done in a given time.

power = energy transferred ÷ time

P (W) = E (J) ÷ t (s)



Energy Stores and Systems

Energy Stores	
kinetic	Moving objects have kinetic energy.
thermal	All objects have thermal energy.
chemical	Anything that can release energy during a chemical reaction.
elastic potential	Things that are stretched.
gravitational potential	Anything that is raised.
electrostatic	Charges that attract or repel.
magnetic	Magnets that attract or repel.
nuclear	The nucleus of an atom releases energy.

Energy can be transferred in the following ways:

mechanically – when work is done;

electrically – when moving charge does work;

heating – when energy is transferred from a hotter object to a colder object.