

The Periodic Table

Dalton's Atomic Model

Dalton's Atomic model states:

- All matter is made of **atoms (tiny particles)**.
- The atoms in an element are all **identical** (but each element has its own type of **atom**)
- Atoms are indestructible and cannot be **created** or **destroyed**.
- In **compounds**, each atom of an element is always joined to a **fixed** number of atoms of another element.
- During chemical reactions, atoms **rearrange** to make **new substances**.

Chemical Reactions

What is a physical change?

A change in which the form of matter is altered but the substance is not transformed into another.

What is a chemical change?

A rearrangement of the atoms of one or more substances, forming a new substance(s).

Physical Trends

Match the keywords with the correct definition.

Flexible	→	Able to be beaten and bent into shape
Boiling point	→	The temperature at which a solid turns into a liquid
Malleable	→	Can bend without breaking
Melting point	→	The mass per unit volume
Density	→	The temperature at which a liquid boils

Chemical Formulae

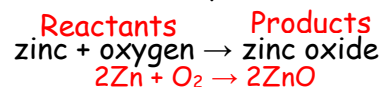
Give the chemical formulae for the following molecules.

Water - H_2O

Carbon dioxide - CO_2

Methane - CH_4

Give the chemical formulae for the following chemical reaction. Label the reactants and products.



Chemical Trends

The oxides of the elements further left on the periodic table (metals) form more **alkaline** solutions when reacted with water.

The oxides of the elements further right on the periodic table (non-metals) form more **acidic** solutions when reacted with water.

Group 1

What is group 1 on the periodic table called?

The **alkali metals**

Name the group 1 metals in order of reactivity going from **most** reactive to **least** reactive.

- Lithium
- Sodium
- Potassium
- Rubidium
- Caesium
- Francium

State the properties of the group 1 metals.

Very reactive, soft, low density, low melting and boiling points, shiny, good conductors.

Mendeleev's Table

Summarise how the following scientists ordered the elements to form the periodic table.

Johann Döbereiner (1829) -

Ordered elements into 'triads' - groups of three with similar properties. E.g. lithium, sodium and potassium.

John Newlands (1864) -

Laws of octaves. Ordered elements in masses of their atoms. Every 8th element had similar properties.

Pattern was not consistent.

Dmitri Mendeleev (1869) -

Elements ordered in increasing masses of their atoms, forming them into groups with similar chemical properties.

Label the modern periodic table with the following:

alkali metals, transition metals, halogens, noble gases

Groups 7 and 0

What are group 7 and group 0 on the periodic table called?

Halogens

Name the group 7 elements on the Periodic Table. Add the properties of the first four group 7 elements.

- Fluorine (pale yellow gas)
- Chlorine (yellow-green gas)
- Bromine (red-brown liquid)
- Iodine (grey solid)
- Astatine
- Tennessine

What is the name of the chemical reaction in which a more reactive element displaces a less reactive element from its compound?

Displacement reaction

How reactive are the group 0 elements?

Group 0 elements are very unreactive.

Light

Light on the Move

Match the keywords with the correct definition.

Absorb	To pass through a substance.
Opaque	A narrow beam of light, or an arrow on a diagram representing the path of light and the direction in which it is travelling.
Ray	To soak up' or 'to take in'.
Reflect	Material that lets light through but scatters it. You cannot see things clearly through translucent materials.
Translucent	Material that does not let light through.
Transmit	A material that light can travel through without scattering.
Transparent	To bounce off a surface instead of passing through it or being absorbed.

Light and sounds waves - fill in the table below.

	Light	Sound
Type of wave	Transverse	Longitudinal
Speed in air	300,000,000 m/s	330 m/s
Travels through:	Vacuum, gases, some liquids, some solids	Matter (solids, liquids and gases)

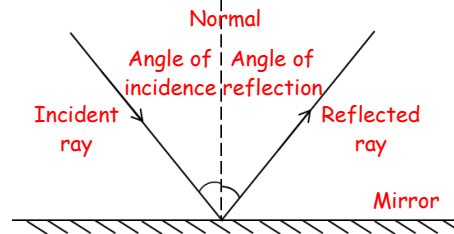
Reflection

What is diffuse reflection?

The light reflected from a rough surface is scattered, going off in all directions.

What is specular reflection? Light reflected from a smooth surface, e.g. a mirror, at a definite angle.

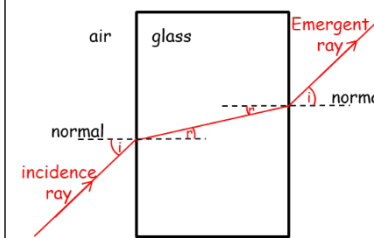
Label the diagram below.



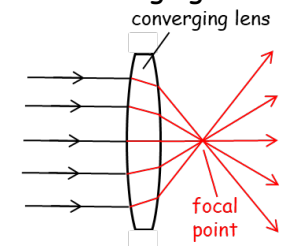
Refraction

What is refraction? A change in the direction of a light wave, caused by the change in the wave's speed.

Add the light rays to the diagram below to show the refraction of light.



Complete the diagram below to show what happens to right rays as they go through a converging lens.



Cameras and Eyes

What is the function of a camera lens?

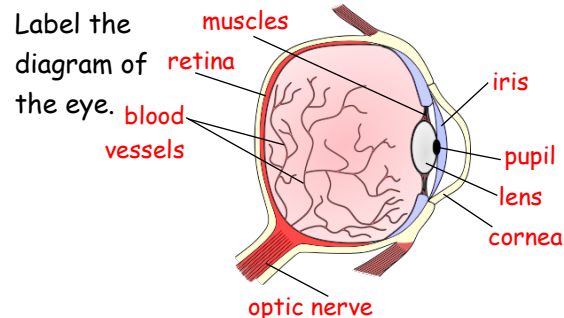
The lens focuses the light.

What does the sensor in a camera change?

The sensor changes energy transferred by light into electrical signals.

What is the aperture in a camera?

The aperture is a hole that can be adjusted to allow different amounts of light into the camera.



Colour

What is dispersion?

The separation of white light into colours of the light spectrum.

Why does white light split into seven colours when shone through a prism?

The different frequencies of white light are refracted by different amounts, causing the colours to spread out.

Name the seven colours of the light spectrum.

1. Red
2. Orange
3. Yellow
4. Green
5. Blue
6. Indigo
7. Violet

Why does a blue object appear blue?

The object absorbs all colours of the light spectrum except blue which it reflects.

Which colour refracts the most? Violet

Which colour refracts the least? Red

Unicellular Organisms

Unicellular & Multicellular

What does unicellular mean?

One-celled organisms.

What does multicellular mean?

Organisms made up of many cells.

State the five main kingdoms of organisms.

1. **Animals**
2. **Plants**
3. **Fungi**
4. **Protoctists**
5. **Prokaryotes**

Diffusion

Define diffusion.

The movement of molecules from an area of high concentration to an area of low concentration.

Why do multicellular organisms need efficient transport systems?

In order for the tissues in multicellular organisms to have all of the raw materials transported to them as diffusion would be too slow.

Which organ system transports materials to all the cells in a human's body?

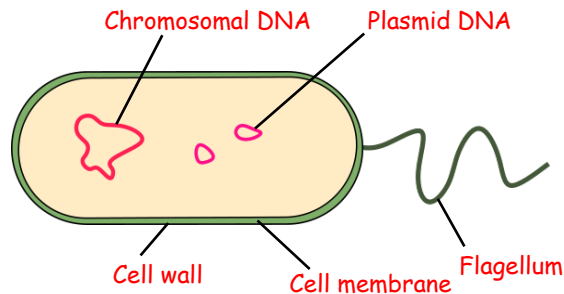
Circulatory system

Bacteria

Explain how bacteria is used to make cheese.

The bacteria cells respire anaerobically, producing lactic acid. Lactic acid turns mild sour and thickens it, used in the production of cheese.

Label the bacteria cell diagram below.



Match the organelles with their functions.

Flagellum	For support and protection
Cell wall	Controls what enters and leaves
Cell membrane	Rotates for movement

State five ways in which bacteria can be spread.

1. **Food**
2. **Touch**
3. **Air**
4. **Vectors**
5. **Water**

What is the use of a statement key?

Used to identify organisms.

Fungi

Yeast is an example of a fungi. How do yeast cells reproduce?

Yeast reproducing by budding, a type of asexual reproduction.

Explain the role of yeast in bread making.

The yeast cells respire aerobically, producing carbon dioxide gas which causes the dough to rise.

Explain the role of yeast in making wine and beer.

The yeast cells respire anaerobically, forming ethanol (alcohol) and carbon dioxide (fermentation).

Give the equation for the anaerobic respiration of yeast.

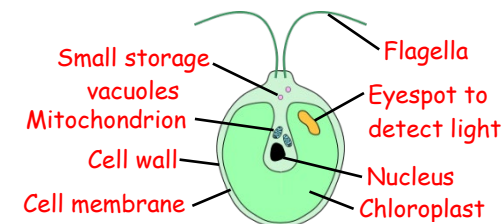
glucose (sugar) → ethanol (alcohol) + carbon dioxide

Protoctists

What is a protoctist?

A single-celled organism of the kingdom Protista, e.g. algae.

Label the diagram of a protoctist.



Decomposers and Carbon

Give two examples of decomposers.

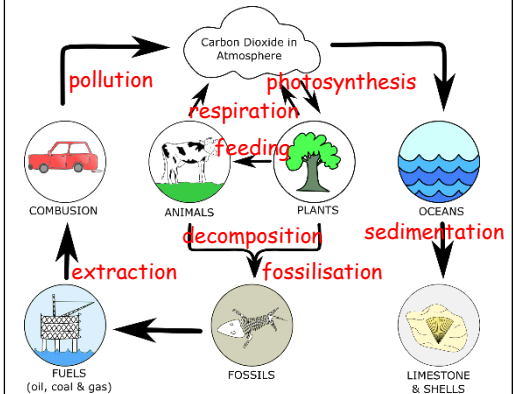
1. **Fungi**
2. **Bacteria**

State the three conditions these microorganisms require.

1. **A source of food**
2. **Warmth**
3. **Moisture**

Decomposers play a vital role in helping to recycle all the carbon in carbohydrates, proteins and fats.

Label the arrows in the carbon cycle diagram below.



What is a producer? **An organism that can make its own food.**

Metals and their Uses

Metal Properties

Fill in the table with the properties of metals and non-metals.

Metals	Non-metals
Shiny	Dull
Malleable	Brittle
High melting points	Low melting points
High densities	Low densities
Good conductors of heat and electricity	Poor conductors of heat and electricity

Give the properties and uses of the following metals.

Steel - Strong. Used to make steel frames for buildings.

Copper - Strong, can be bent into shape, unreactive, flexible and a good conductor of electricity. Used to make water pipes and electrical wires.

Lead - Malleable and unreactive. Used to make lead flashings.

Aluminium - Strong, unreactive and has a low density. Used to make frames for lightweight buildings, e.g. greenhouses.

What is a catalyst? A catalyst speeds up a reaction without being used up itself.

Chemical Tests

Describe the tests for the following:

Test for carbon dioxide

Turns limewater from clear to cloudy.

Test for hydrogen

Hydrogen makes a 'squeaky pop' sound when ignited with a lit splint.

Corrosion

Define corrosion.

The reaction at a metal's surface with oxygen.

Order the following metals into the reactivity series.

3	Calcium	8	Gold
2	Sodium	5	Zinc
4	Magnesium	6	Iron
1	Potassium	7	Copper

Will zinc or calcium react more quickly with oxygen?

Calcium, as calcium is a more reactive metal.

Complete the equations below.

Potassium + oxygen → potassium oxide

Zinc + oxygen → zinc oxide

Magnesium + oxygen → magnesium oxide

Pure Metals and Alloys

What is a mixture?

Two or more substances jumbled together.

What is an alloy?

A metal with one or more other elements added.

Give an example of an alloy and its use, stating the improved properties for its use.

Duralumin (Aluminium with added copper and magnesium), lighter and stronger than aluminium, used in making aircraft.

Explain why alloys often have melting point ranges.

Because alloys contain a mix of different elements with different melting points.

Test for water

Turns cobalt chloride paper from blue to pink.

Metals and Water

Why are the group 1 metals called the alkali metals? They form alkali solutions when react with water.

Give the general word equation for the reaction of metal in water.

metal + water → metal hydroxide + hydrogen

Complete the equations below.

Sodium + water → sodium hydroxide + hydrogen

Lithium + water → lithium hydroxide + hydrogen

Magnesium + water → magnesium hydroxide + hydrogen

Metals and Acids

What gas is produced when metals react with either water or acid? Hydrogen

Does magnesium react faster or slower in acid than in water? Reacts faster in acid.

Give an observation you make when you react a metal with acid. Bubbling, heat released.

Give the general word equation for the reaction of metal in acid.

metal + acid → salt + hydrogen

Complete the equations below.

Sodium + Hydrochloric acid → Sodium hydroxide +

Copper + Sulfuric acid → Copper sulfate + hydrogen

Zinc + Nitric acid → Zinc nitrate + hydrogen