Use this guide to check that you cover all the topics you have studied in Year 8 and Year 7 at key stage 3. You can use your classwork books, revision guides and the internet to help you revise.

Revision top tips

- Start early
- Do a small amount at a time (1/2 hour every day)
- Make revision cards or notes.
- Define key terms.
- Use colour and diagrams
- Try some practise questions. - These will be on show my homework

Useful Link

https://www.bbc.com/education/subjects/zng4d2p

Scientific Investigations

| Planning the experiment | Identify factors that could affect the outcome of an experiment.  
| Recognise and make predictions  
| Decide what equipment should be used  
| Write how to do a practical in simple clear steps.  
| Doing the experiment | Decide what should be done to make the experiment a fair test.  
| Explain how to get reliable results  
| Describe how to make results accurate.  
| Looking at the results | Draw a line graph and a bar chart.  
| Read values off a line graph  
| Draw a table to record results.  
| State simply why the results in a table or a graph show.  
| List the units for time, mass, speed and temperature, try to name 3 more.  
| Evaluating the findings | Decide whether enough evidence has been collected.  
| Explain whether the results collected match the conclusion.  
| Explain whether the experiment done was a fair test and if not why not.  
| Identify errors that have been made when doing a practical.  

# Biology

## Life processes and cells

| Life Processes | What does “MRS GREN” stand for?  
| e.g. M=Movement |
|----------------|----------------------------------|
| Plant and animal cells | Draw and label diagrams of the two types of cell.  
| Which parts do they have in common?  
| What does each part do in the cell? |
| Specialised cells | Name 3 specialised animal and 3 specialised plant cells.  
| Explain how their structure helps with their job. |
| Organisation | Cell, tissue, organs, system, organism  
| Name 5 Organs and describe what they do?  
| Identify what systems they belong to? |

### Key Words

**Cell:** The unit of a living organism, contains parts to carry out life processes.

**Uni-cellular:** Living things made up of one cell.

**Multi-cellular:** Living things made up of many types of cell.

**Tissue:** Group of cells of one type.

**Organ:** Group of different tissues working together to carry out a job.

**Diffusion:** One way for substances to move into and out of cells.

**Structural adaptations:** Special features to help a cell carry out its functions.

**Cell membrane:** Surrounds the cell and controls movement of substances in and out.

**Nucleus:** Contains genetic material (DNA) which controls the cell’s activities.

**Vacuole:** Area in a cell that contains liquid and can be used by plants to keep the cell rigid and store substances.

**Mitochondria:** Part of the cell where energy is released from food molecules.

**Cell wall:** Strengthens the cell. In plant cells it is made of cellulose.

**Chloroplast:** Absorbs light energy so the plant can make food.

**Cytoplasm:** Jelly-like substance where most chemical processes happen.

## Variation, Classification and Inheritance

| Variation and inheritance | Explain why members of the same species can be different.  
| Describe what cause variation  
| Explain natural and artificial selection |

### Key Words

**Species:** A group of living things that have more in common with each other than with other groups.

**Variation:** The differences within and between species.

**Continuous variation:** Where differences between living things can have any numerical value.

**Discontinuous variation:** Where differences between living things can only be grouped into categories.

**Inherited characteristics:** Features that are passed from parents to their offspring.

**DNA:** A molecule found in the nucleus of cells that contains genetic information.

**Chromosomes:** Thread-like structures containing tightly coiled DNA.

**Gene:** A section of DNA that determines an inherited characteristic.
### Humans as organisms

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
</tr>
</thead>
</table>
| **Healthy Diet** | Name the 7 main nutrients and why we need them.  
Name 4 vitamins and minerals and what they are for.  
What food should you eat to give you the different nutrients?  
Why do people need different diets?  
| **Body systems:** | Draw and label a diagram of each system  
Explain the special features of each system e.g. alveoli  
Describe the route of blood around your body.  
Create a flow diagram to summarise digestion  
| **Healthy body** | What are micro-organisms?  
How are diseases spread?  
Describe the effects or smoking, alcohol and lack of exercise on the body?  

### Key Words

- **Immune system:** Protects the body against infections.
- **Digestive system:** Breaks down and then absorbs food molecules.
- **Circulatory system:** Transports substances around the body.
- **Respiratory system:** Replaces oxygen and removes carbon dioxide from blood.
- **Breathing:** The movement of air in and out of the lungs.
- **Trachea (windpipe):** Carries air from the mouth and nose to the lungs.
- **Bronchi:** Two tubes which carry air to the lungs.
- **Bronchioles:** Small tubes in the lung.
- **Alveoli:** Small air sacs found at the end of each bronchiole.
- **Ribs:** Bones which surround the lungs to form the ribcage.
- **Diaphragm:** A sheet of muscle found underneath the lungs.
- **Lung volume:** Measure of the amount of air breathed in or out.
- **Enzymes:** Substances that speed up the chemical reactions of digestion.
- **Dietary fibre:** Parts of plants that cannot be digested, which helps the body eliminate waste.
- **Carbohydrates:** The body’s main source of energy. There are two types: simple (sugars) and complex (starch).
- **Lipids:** (fats and oils) A source of energy. Found in butter, milk, eggs, nuts.
- **Protein:** Nutrient your body uses to build new tissue for growth and repair. Sources are meat, fish, eggs, dairy products, beans, nuts and seeds.
- **Stomach:** A sac where food is mixed with acidic juices to start the digestion of protein and kill microorganisms.
- **Small intestine:** Upper part of the intestine where digestion is completed, and nutrients are absorbed by the blood.
- **Large intestine:** Lower part of the intestine from which water is absorbed and where faeces are formed.
- **Gut bacteria:** Microorganisms that naturally live in the intestine and help food break down.
### Plants

- **Draw and label a diagram of the leaf, explain what processes happen in the leaf.**
- **Write the word equation for photosynthesis**
- **Name and state the function of the other parts of the plant.**

#### Key Words
- **Fertilisers:** Chemicals containing minerals that plants need to build new tissues.
- **Photosynthesis:** A process where plants and algae turn carbon dioxide and water into glucose and release oxygen.
- **Chlorophyll:** Green pigment in plants and algae which absorbs light energy.
- **Stomata:** Pores in the bottom of a leaf which open and close to let gases in and out.

### Living things and their environment

<table>
<thead>
<tr>
<th>Habitats and inheritance</th>
<th>Name some different habitats and identify the plants and animals found there. Explain how the organisms are adapted to their environment.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Feeding relationships and competition</td>
<td>Draw a food chain or a food web. Explain what happens to the energy available at each stage in the food chain. Use key terms correctly. (Predator, prey, producer, consumer, carnivore, herbivore etc) Describe how organisms are in competition for resources such as light, food &amp; shelter. Explain why the population of a species may change.</td>
</tr>
</tbody>
</table>

#### Key Words
- **Food web:** Shows how food chains in an ecosystem are linked.
- **Food chain:** Part of a food web, starting with a producer, ending with a top predator.
- **Ecosystem:** The living things in a given area, and their non-living environment.
- **Environment:** The surrounding air, water, and soil where an organism lives.
- **Population:** Group of the same species living in an area.
- **Producer:** Green plant or algae that makes its own food using sunlight.
- **Consumer:** Animal that eats other animals or plants.
- **Decomposer:** Organism that breaks down dead plant and animal material so nutrients can be recycled back to the soil or water.
- **Population:** Group of organisms of the same kind living in the same place.
- **Biodiversity:** The variety of living things. It is measured as the differences between individuals of the same species, or the number of different species in an ecosystem.
- **Competition:** When two or more living things struggle against each other to get the same resource.
## Chemistry

### Substances and States of Matter

<table>
<thead>
<tr>
<th>States of matter</th>
<th>Name three states of matter and describe how their particles are arranged.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>List the different properties of the three states of matter.</td>
</tr>
<tr>
<td></td>
<td>Use key terms correctly, evaporation, sublimation, condensation, freezing etc</td>
</tr>
<tr>
<td></td>
<td>Explain gas pressure and diffusion in terms of particles.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Atoms and elements</th>
<th>Describe what is meant by an atom and element.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Give the chemical symbols of common elements (copper, lead, oxygen, hydrogen etc)</td>
</tr>
<tr>
<td></td>
<td>Describe some of the properties of common elements e.g. it’s a conductor</td>
</tr>
<tr>
<td></td>
<td>List the properties of metals and non-metals.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Mixtures and compounds</th>
<th>Explain the difference between elements a compound and a mixture.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Explain how a mixture can be separated by filtration, distillation etc</td>
</tr>
</tbody>
</table>

### Key Words

**Particle:** A very tiny object such as an atom or molecule, too small to be seen with a microscope.

**Particle Model:** A way to think about how substances behave in terms of small, moving particles.

**Diffusion:** the process by which particles in liquids or gases spread out through random movement from a region where there are many particles to one where there are fewer.

**Gas pressure:** Caused by collisions of particles with the walls of a container.

**Evaporate:** Change from liquid to gas at the surface of a liquid, at any temperature.

**Boil:** Change from liquid to a gas of all the liquid when the temperature reaches boiling point.

**Condense:** Change of state from gas to liquid when the temperature drops to the boiling point.

**Melt:** Change from solid to liquid when the temperature rises to the melting point.

**Freeze:** Change from liquid to a solid when the temperature drops to the melting point.

**Sublime:** Change from a solid directly into a gas.

**Solvent:** A substance, normally a liquid, that dissolves another substance.

**Solute:** A substance that can dissolve in a liquid.

**Dissolve:** When a solute mix completely with a solvent.

**Pure substance:** Single type of material with nothing mixed in.

**Mixture:** Two or more pure substances mixed together, whose properties are different to the individual substances.

**Filtration:** Separating substances using a filter to produce a filtrate (solution) and residue.

**Distillation:** Separating substances by boiling and condensing liquids.

**Evaporation:** A way to separate a solid dissolved in a liquid by the liquid turning into a gas.

**Chromatography:** Used to separate different coloured substances.

**Elements:** what all substances are made up of, and which contain only one type of atom.

**Atom:** The smallest particle of an element that can exist.

**Compound:** Pure substances made up of two or more elements strongly joined together.
## Changing materials

### Physical and chemical change
- Identify physical and chemical changes.
- Explain observations made of a chemical change, e.g. if bubbles are seen.
- Explain dissolving in terms of particles.
- Define solvent, solute, solution, solubility correctly.
- Explain factors which affect solubility e.g. temperature.

### Word equations
- What are reactants and products?
- Write the word equations for simple reactions e.g. metal & oxygen, metal & acid, acid & alkali.

### Key Words

**Chemical reaction:** A change in which a new substance is formed.

**Physical change:** One that changes the physical properties of a substance, but no new substance is formed.

**Reactants:** Substances that react together, shown before the arrow in an equation.

**Products:** Substances formed in a chemical reaction, shown after the reaction arrow in an equation.

**Solution:** Mixture formed when a solvent dissolve a solute.

**Soluble:** (insoluble) Property of a substance that will (will not) dissolve in a liquid.

**Solubility:** Maximum mass of solute that dissolves in a certain volume of solvent.

**Periodic table:** Shows all the elements arranged in rows and columns.

**Physical properties:** Features of a substance that can be observed without changing the substance itself.

**Chemical properties:** Features of the way a substance reacts with other substances.

**Reactants:** Substances that react together, shown before the arrow in an equation.

**Products:** Substances formed in a chemical reaction, shown after the reaction arrow in an equation.

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### Patterns of behaviour

<table>
<thead>
<tr>
<th>Metals</th>
<th>Describe how metals react with air, water and acids. (Group 1)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Which metals react violently with water?</td>
</tr>
<tr>
<td></td>
<td>Which don’t react with water at all?</td>
</tr>
<tr>
<td></td>
<td>Put metals in order of reactivity.</td>
</tr>
<tr>
<td></td>
<td>Use the reactivity series to predict the outcomes of displacement reactions.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Non-metals</th>
<th>Describe physical and chemical properties of non-metals in the periodic table (group 7)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>Acid and alkali</th>
<th>Name some acids and alkalis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Use the pH scale and locate acid, alkali and neutral on it.</td>
</tr>
<tr>
<td></td>
<td>Describe how acids can be neutralised.</td>
</tr>
<tr>
<td></td>
<td>Write word equations for acid reactions</td>
</tr>
</tbody>
</table>

### Key Words

**Metals:** Shiny, good conductors of electricity and heat, malleable and ductile, and usually solid at room temperature.

**Non-metals:** Dull, poor conductors of electricity and heat, brittle and usually solid or gaseous at room temperature.

**Displacement:** Reaction where a more reactive metal takes the place of a less reactive metal in a compound.

**Oxidation:** Reaction in which a substance combines with oxygen.

**Reactivity:** The tendency of a substance to undergo a chemical reaction.

**pH:** Scale of acidity and alkalinity from 0 to 14.

**Indicators:** Substances used to identify whether unknown solutions are acidic or alkaline.

**Base:** A substance that neutralises an acid - those that dissolve in water are called alkalis.

**Concentration:** A measure of the number of particles in a given volume.
**Structure of the Earth**

| The rock cycle | Be able to explain the Sequence of processes where rocks change from one type to another. Construct a labelled diagram to identify the processes of the rock cycle |
| Formation of igneous, sedimentary and metamorphic rocks | Explain the formation of the different types of rock and how they are formed. Explain why a rock has a particular property based on how it was formed. Identify the causes of weathering and erosion and describe how they occur. |

**Key words**
- **Weathering**: The wearing down of rock by physical, chemical or biological processes.
- **Erosion**: Movement of rock by water, ice or wind (transportation).
- **Rock cycle**: Sequence of processes where rocks change from one type to another.
- **Strata**: Layers of sedimentary rock.
- **Sedimentary rocks**: Formed from layers of sediment, and which can contain fossils. Examples are limestone, chalk and sandstone.
- **Igneous rocks**: Formed from cooled magma, with minerals arranged in crystals. Examples are granite, basalt and obsidian.
- **Metamorphic rocks**: Formed from existing rocks exposed to heat and pressure over a long time. Examples are marble, slate and schist

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**Physics**

**Forces and motion**

| Balanced and unbalanced forces | Explain the affect of forces on an object. Name 3 forces. Work out the size of a force from how an object is moving. |
| Speed | Recall the formula that links speed, distance and time. Calculate speed e.g. if an object takes 30 seconds to travel 90 metres what is the average speed? |
| Friction | Describe two ways of reducing friction. Explain how a parachute works. |
| Pressure & Density | Recall the formula that links pressure, force and area. How do snowshoes help you walk on snow? Explain how density determines if an object sinks or floats |

**Key Words**
- **Weight**: The force of gravity on an object (N).
- **Non-contact force**: One that acts without direct contact.
- **Mass**: The amount of stuff in an object (kg).
- **Speed**: How much distance is covered in how much time.
- **Average speed**: The overall distance travelled divided by overall time for a journey.
- **Relative motion**: Different observers judge speeds differently if they are in motion too, so an object’s speed is relative to the observer’s speed.
- **Deformation**: Changing shape due to a force.
- **Newton**: Unit for measuring forces (N).
- **Resultant force**: Single force which can replace all the forces acting on an object and have the same effect.
- **Friction**: Force opposing motion which is caused by the interaction of surfaces moving over one another. It is called ‘drag’ if one is a fluid.
- **Tension**: Force extending or pulling apart.
- **Compression**: Force squashing or pushing together.
- **Contact force**: One that acts by direct contact.
- **Upthrust**: The upward force that a liquid or gas exerts on a body floating in it.
## Electromagnets

| Magnetism | Recall the laws of magnetic attraction  
| Explain how a magnetic field can be represented by field lines  
| Describe key features of the Earth’s magnetic field  
| Draw field s around a combination of magnets |
| Electromagnetism | Describe how to make an electromagnet  
| Explain how to change the strength of an electromagnet  
| Describe and give examples of the use of electromagnets |

### Key Words

**Magnet:** A material with a magnetic field around it in which a magnetic material experiences a force on a magnetic material  
**North pole:** End of a magnet that attracts the south pole of a magnet  
**South pole:** End of a magnet that attracts the north pole of a magnet  
**Magnetic field lines:** Imaginary lines that show the direction of the force on a magnetic material  
**Electromagnet:** A non-permanent magnet.  
**Solenoid:** A coil of wire wrapped around a core

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## Sound and light

### Sound

**What causes sound?**  
Draw sound waves showing loud or high-pitched sounds.  
**What do amplitude, frequency and wavelength mean?**

### Light

Draw ray diagrams showing reflection and refraction.  
Name the primary and secondary colours of light.  
**What happens when white light shines onto a red filter?**  
**Explain why a green cap looks black in blue light.**

### Key Words

**Vibration:** A back and forth motion that repeats.  
**Longitudinal wave:** Where the direction of vibration is the same as that of the wave.  
**Volume:** How loud or quiet a sound is, in decibels (dB).  
**Pitch:** How low or high a sound is. A low (high) pitch sound has a low (high) frequency.  
**Amplitude:** The maximum amount of vibration, measured from the middle position of the wave, in metres.  
**Wavelength:** Distance between two corresponding points on a wave, in metres.  
**Frequency:** The number of waves produced in one second, in hertz.  
**Vacuum:** A space with no particles of matter in it.  
**Oscilloscope:** Device able to view patterns of sound waves that have been turned into electrical signals.  
**Auditory range:** The lowest and highest frequencies that a type of animal can hear.  
**Echo:** Reflection of sound waves from a surface back to the listener.  
**Incident ray:** The incoming ray.  
**Reflected ray:** The outgoing ray.  
**Normal line:** From which angles are measured, at right angles to the surface.  
**Angle of reflection:** Between the normal and reflected ray.  
**Angle of incidence:** Between the normal and incident ray.  
**Refraction:** Change in the direction of light going from one material into another.  
**Scattering:** When light bounces off an object in all directions.  
**Transparent:** A material that allows all light to pass through it.  
**Translucent:** A material that allows some light to pass through it.  
**Opaque:** A material that allows no light to pass through it.  
**Convex lens:** A lens that is thicker in the middle which bends light rays towards each other.  
**Concave lens:** A lens that is thinner in the middle which spreads out light rays.
Electricity

Key Words

- **Potential difference (voltage):** The amount of energy shifted from the battery to the moving charge, or from the charge to circuit components, in volts (V).
- **Resistance:** A property of a component, making it difficult for charge to pass through, in ohms (Ω).
- **Electrical conductor:** A material that allows current to flow through it easily, and has a low resistance.
- **Electrical insulator:** A material that does not allow current to flow easily, and has a high resistance.
- **Current:** Flow of electric charge, in amperes (A).

Energy resources and transfers

**Energy resources**
- Where does most of the earth’s energy come from?
- What are fossil fuels?
- Name three renewable energy resources.
- Draw a diagram to show how energy is generated from coal.

**Energy transfers**
- List 5 different forms of energy.
- State the energy transformation for a television.
- Describe how energy is lost from a house.
- Explain why energy conservation is important.

Key Words

- **Fossil fuels:** Non-renewable energy resources formed from the remains of ancient plants or animals. Examples are coal, crude oil and natural gas.
- **Non-renewable:** An energy resource that cannot be replaced and will be used up.
- **Renewable:** An energy resource that can be replaced and will not run out. Examples are solar, wind, waves, geothermal and biomass.
- **Energy resource:** Something with stored energy that can be released in a useful way.
- **Power:** How quickly energy is transferred by a device (watts).
- **Thermal energy store:** Filled when an object is warmed up.
- **Chemical energy store:** Emptied during chemical reactions when energy is transferred to surroundings.
- **Kinetic energy store:** Filled when an object speeds up.
- **Gravitational potential energy store:** Filled when an object is raised.
- **Elastic energy store:** Filled when a material is stretched or compressed.

Energy Heating & Cooling

**Heating and Cooling**
- What is conduction, convection and Radiation?
- Explain how a method of thermal insulation works in terms of conduction, convection and radiation.
- Explain observations about changing temperature in terms of energy transfer.

Key Words

- **Thermal conductor:** Material that allows heat to move quickly through it.
- **Thermal insulator:** Material that only allows heat to travel slowly through it.
- **Temperature:** A measure of the motion and energy of the particles.
- **Thermal energy:** The quantity of energy stored in a substance due to the vibration of its particles.
- **Conduction:** Transfer of thermal energy by the vibration of particles.
- **Convection:** Transfer of thermal energy when particles in a heated fluid rise.
- **Radiation:** Transfer of thermal energy as a wave.