Rayner Stephens
HIGH SCHOOL

Curriculum Intent

for

Science

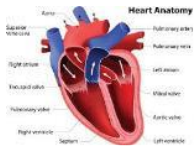
The intent of science at Rayner Stephens High School is to provide students with a high-quality science education that provides the foundations for understanding the world through the specific disciplines of biology, chemistry and physics. Science has changed our lives and is vital to the world's future prosperity, and all our pupils should be taught essential aspects of the knowledge, methods, processes and uses of science. Through building up a body of key foundational knowledge and concepts, our pupils will be encouraged to recognise the power of rational explanation and develop a sense of excitement and curiosity about natural phenomena. They will be encouraged to understand how science can be used to explain what is occurring, predict how things will behave, and analyse causes.

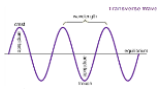
Rayner Stephens High School

Science Learning Journey

Written Exam
6 x 1hr 15 min for combined
6 x1hr45min for separate science

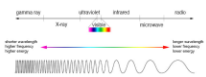
Revision
Ecology
Variation and Evolution
Using Resources
Magnetism
Chemistry and the atmosphere
Homeostasis
Organic Chemistry
Rate of chemical change

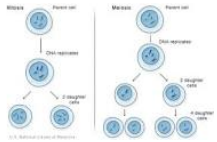




YEAR 11

Bioenergetics
Energy Changes
Particle Model of Matter
Chemical Changes
Infection and Response
The Periodic Table
Forces
Human Nervous system
Chemical Analysis
Waves
Reproduction



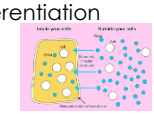


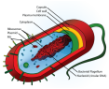
YEAR 10

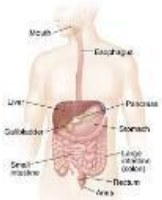
Electricity
Bonding, structure and matter
Quantitative Chemistry
Cell Division
Using Resources
Home Electricity
Heating
Human Interaction

YEAR 9

Light
Nutrition
Growth and Differentiation
Acceleration
Chemistry of the Atom
Genetics
Sound and Waves
Life Diversity
Changing Substances
Movement and Pressure
Tissues and Organs





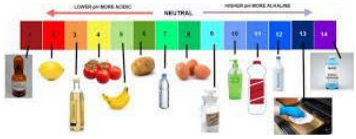


YEAR 8

Electric Circuits: Resistance
Earth Systems
Magnetism
Respiration and Photosynthesis
Acids and Alkalis
Electric Circuits: Current and Voltage
Mixtures

YEAR 7

Particles
Reproduction
Gravity
Cells
Contact Forces
Elements, atoms and compounds
Interdependence
Energy Transfer



Year 7 - Science						
Curriculum intent	In year 7 learners will begin to develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics. They will start to develop an understanding of the nature, processes and methods of science through different types of scientific enquiries that help them to answer scientific questions about the world around them. Through this learners will lay the foundations needed to become equipped with the scientific knowledge required to understand the uses and implications of science, today and for the future.					
Term	**Autumn 1**	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Knowledge	**Cells-** Learners will use a range of investigative techniques to understand how organisms rely on cells to carry out life processes. **Particles:** Learners will use a range of investigative techniques to understand how solids, liquids and gases behave and how they change state.	**Contact Forces -** Learners will be able to describe how materials behave in special ways when forces such as tension and compression are applied. **Reproduction**-Learners will look at the main reproductive organs and their function, what happens during puberty, menstruation and pregnancy.	**Elements, Atoms & Compounds -** Learners will learn about elements, atoms and compounds, their position in the periodic table and the differences between metals and non-metals. **Gravity**- Learners will understand how forces make things change: their speed, direction and/or shape of an object. Learners will also understand how the Earth fits into the solar system and the magnitude of the universe.	**Interdependence -** Learners will learn about feeding relationships within a community of organisms. **Energy Transfers-** Learners will understand the value of energy, how it is transferred between objects and can be used in physical processes and mechanisms. .	**Mixtures**- Learners will look at what a pure substance is and how to identify them. They will also learn what a mixture is and the different methods used to separate them.	**Voltage and Current -** Learners will learn the symbols and function of the various circuit components, and use a range of investigative techniques to understand how voltage and current varies in circuits.

<table>
<tr><td>Skills</td><td colspan="6">The following skills will be developed throughout the whole of year 7 and will enable learners to build a deep understanding of science:
Scientific attitudes:
 pay attention to objectivity and concern for accuracy, precision, repeatability and reproducibility
 understand that scientific methods and theories develop as earlier explanations are modified to take account of new evidence and ideas, together with the importance of publishing results and peer review
 evaluate risks.

Experimental skills and investigations:
 ask questions and develop a line of enquiry based on observations of the real world, alongside prior knowledge and experience
 make predictions using scientific knowledge and understanding
 select, plan and carry out the most appropriate types of scientific enquiries to test predictions, including identifying independent, dependent and control variables, where appropriate
 use appropriate techniques, apparatus, and materials during fieldwork and laboratory work, paying attention to health and safety
 make and record observations and measurements using a range of methods for different investigations; and evaluate the reliability of methods and suggest possible improvements
 apply sampling techniques.

Analysis and evaluation:
 apply mathematical concepts and calculate results
 present observations and data using appropriate methods, including tables and graphs
 interpret observations and data, including identifying patterns and using observations, measurements and data to draw conclusions
 present reasoned explanations, including explaining data in relation to predictions and hypotheses
 evaluate data, showing awareness of potential sources of random and systematic error
 identify further questions arising from their results.

Measurement:
 understand and use SI units and IUPAC (International Union of Pure and Applied Chemistry) chemical nomenclature
 use and derive simple equations and carry out appropriate calculations
 undertake basic data analysis including simple statistical techniques.</td></tr>
<tr><td>Assessments</td><td>End of half term test & HFL’S</td><td>End of half term test & HFL’S</td><td>End of half term test & HFL’S</td><td>End of half term test & HFL’S</td><td>End of half term test & HFL’S</td><td>End of half term test & HFL’S</td></tr>
<tr><td>Enrichment</td><td colspan="6">Trip to Science and Industry Museum
Lab Rats</td></tr>
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Year 7 GCSE Science Autumn Term Knowledge Organiser - Forces

Key Vocabulary:

1	**Air resistance**	A force that acts in the opposite direction to motion.
2	**Contact**	When two objects touch each other to cause a reaction.
3	**Deformation**	When a force changes the shape of an object.
4	**Drag**	A force of resistance that opposes motion in fluids and includes air resistance and water resistance.
5	**Extension**	The difference between the original length of an object and its length after it has been stretched.
6	**Force**	A push, pull or twist that can change the shape, speed or direction of an object.
7	**Free-body force diagrams**	Diagrams that are used to show how forces act on an object.
8	**Friction**	The resistance to motion of between two surfaces
9	**Gravity**	A force of attraction that acts between all objects with mass.
10	**Interaction**	When forces or objects affect one another.
11	**Lubricant**	A substance that can be used to reduce friction.
12	**Magnetic**	A force caused by magnets.
13	**Non-contact**	A force that acts on an object without coming physically in contact with it.
14	**Opposing**	To work against each other.
15	**Resultant force**	The net force or the overall effect of all the forces acting on an object.
16	**Tension**	A force exerted on a rope, chain, string or cable.
17	**Water resistance**	A type of force that acts in the opposite direction to motion on objects that are moving through water

18 Forces

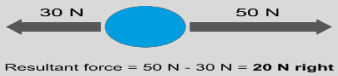
1. A force is an interaction (e.g. a push, pull or twist) between 2 objects.
2. A force can change an object's shape, speed or direction.
3. Forces are either contact or non-contact
4. Contact forces need the objects to be touching.
5. Examples of contact forces include: drag forces, friction, air resistance, tension and normal contact forces.

6. Non-contact forces can act at a distance. They do not need the objects to be touching.
7. Examples of non-contact forces include: gravity, electrostatic attraction and magnetism.
8. Forces have size and direction.
9. Forces acting on one object are represented by free-body force diagrams using arrows to show the direction and size.

19 Balanced and Unbalanced Forces

1. Forces are balanced *only* when forces acting on the same object are equal in size but opposite in direction.
2. An object's motion or shape does not change if the forces are balanced.
3. Unbalanced forces change an object's shape, speed or direction.
4. The unit of force is Newton (N).
5. The resultant force on an object is the net force or the overall effect of all the forces acting on an object.
6. When forces are balanced the resultant force is 0N.

7. When the forces are unbalanced the resultant force is *not* 0N.

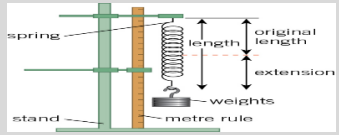


20 Interaction Pairs

1. Forces *always* act in interaction pairs.
2. Interaction pairs act on 2 different objects.
3. If A exerts a force on B, then B exerts a force on A. The forces are equal in size but opposite in direction.

21 Deformation

1. Changing the shape of an object can be called deformation.
2. The extension of a spring is an example of deformation.
3. The extension of a spring = final length- original length.
4. The extension of spring can be measured when different weights are added.
5. The extension is larger when more weight is added.



6. If too much force is added, then a spring does not return to its original shape. The spring has reached its elastic limit.

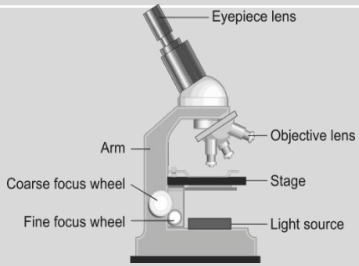
22 Drag Forces & Friction

1. Drag forces occur in fluids. Fluids are liquids and gases. Drag forces include water resistance and air resistance.
2. Friction occurs between solids.
3. Drag forces and friction are caused by interaction of 2 objects moving or trying to move over one another.
4. Drag forces and friction act in the opposite direction to motion.
5. To move a block along a surface, the forces need to be unbalanced. The pulling force needs to be just bigger than friction.

6. Rougher surfaces generate more friction than smoother surfaces.
7. Friction is reduced by adding a lubricant.

Year 7 GCSE Science Autumn Term Knowledge Organiser - Cells

Key Vocabulary:

1	Hazard	Something that can cause harm
2	Risk	The harm that might happen to you or someone else
3	Precaution	What you do to prevent a hazard from causing harm
4	Nucleus	Controls the cells activities because it contains DNA
5	Cell Membrane	Controls what enters and leaves the cell
6	Cytoplasm	A jelly-like substance where reactions happen
	Mitochondria	Where aerobic respiration takes place
7	Cell Wall	Surrounds plant cells and provides strength and support
8	Chloroplast	Where photosynthesis take place to make food (glucose) for the plant and contain chlorophyll to absorb sunlight
9	Vacuole	Contains a liquid that stores substances for the cell and keeps it rigid
10	Specialised Cells	Different structures that let them carry out their function
11	Microscope	

Asking Questions and Cells

12 Science is about…

a) observing the world (watching and listening)
b) asking questions about nature and how the world works
c) coming up with ideas and explanations that explain what we see
d) testing our ideas to see if they are true
e) using our knowledge and skills to solve problems and improve lives

13 A scientific question is one that…

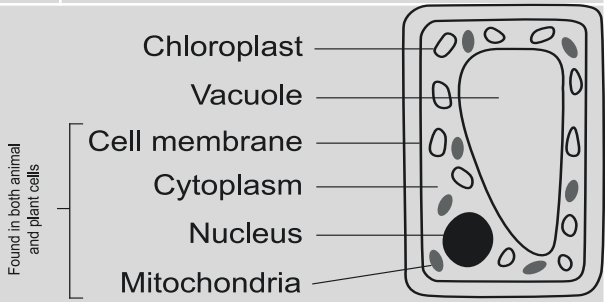
a) Can be answered
b) Can be tested or measured

14 Living Organisms

- Living things are called organisms
- All organisms carry out the 7 life processes: movement, respiration, sensitivity, growth, reproduction, excretion and nutrition
- All living things are made of cells
- Unicellular organisms are made of only one cell e.g. bacteria
- Multicellular organisms are made of many cells e.g. humans

15 Animal Cells

16 Plant Cells



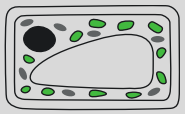
Specialised Cells and Microscopes

17 Specialised Cells

Sperm cells: Their function is to swim to the egg cell for fertilisation. The structure that helps them to do this is a tail for swimming

Neurons (nerve cells): Their function is to send messages to control the body. The structure that helps them to do this is a long axon and connections at the end

Palisade cells: Their function is to take in lots of sunlight (for photosynthesis to make food). Their structure helps them to do this as they have lots of chloroplasts



Root hair cells: Their function is to take in lots of water. To help them to do this, their structure consists of a large surface area to take water in

18 Microscopes

- A microscope is used to make something small appear much larger.
- To calculate the magnification of an image seen under the microscope, this equation can be used:
- Magnification = eyepiece magnification x objective lens magnification

19 Organisation

- A group of the same cells working together is called a tissue
- A group of tissues working together for the same function is called an organ
- A group of organs working together for the same function is called an organ system
- There are many organ systems in the human body including: respiratory, excretory, nervous, muscular, circulatory, skeletal and digestive

Year 7 Science Autumn Term Knowledge Organiser – Elements, Atoms & Compounds

Key Vocabulary:

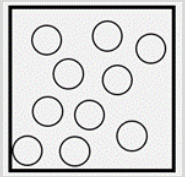
1	**Atom**	The smallest particle of an element that can exist.
2	**Condensing**	A physical process that results in the change of state from a gas or vapour to a liquid.
3	**Compound**	A compound is a substance that contains two or more elements chemically bonded together.
4	**Corrosive**	Has the potential to seriously damage skin or surfaces. *The **corrosive** liquid burned through the bench.*
5	**Element**	A substance made up of only one type of atom. *Oxygen is an **element**.*
6	**Flammable**	Will set on fire easily.
7	**Matter**	Any substance which takes up space and has mass. *All the chemicals were made of **matter.***
8	**Molecule**	A small group of non-metal atoms chemically joined together *There are millions of **molecules** of water in a swimming pool.*
9	**Malleable**	Can easily be shaped.
10	**Particle**	A tiny portion of matter.
11	**Periodic Table**	A table which orders all of the known chemical elements.
12	**Sonorous**	Makes a ringing sound when struck.
13	**State**	Short for 'state of matter'. The states of matter are solid, liquid and gas. *The **state** of water at room temperature is liquid.*

Elements & Periodic Table

14. Elements

1. All substances are composed of atoms
2. Elements are made from only one type of atom.

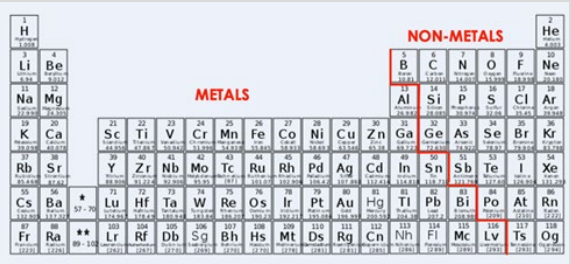
e.g. this diagram shows an element because it is made from only one type of atom.



3. There are about 100 different elements
4. An atom is the smallest part of an element that can exist
5. Elements have specific physical and chemical properties.
6. Physical properties = state, appearance, smell, magnetic, etc.
7. Chemical properties = what it reacts with and how reactive it is

15. Periodic Table

8. Elements are organised in the Periodic Table
9. The Periodic Table is organised into periods and groups
10. Groups are vertical columns
11. Periods are horizontal rows
12. Elements in a group have similar chemical properties
13. Metals are on the left hand side of the 'staircase' and non-metals are on the right hand side of the 'staircase'.



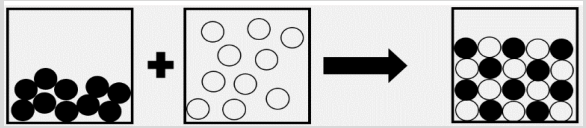
16. Hazard Symbols

Compounds and formulae

17. Compounds

14. Compounds are formed from elements by chemical reactions
15. Chemical reactions always involve the production of one or more new substances

e.g. in the diagram below there are two elements that when they react together, make a new compound



liquid element gas element solid compound

16. A compound contains two or more elements chemically joined together in fixed proportions
17. A compound has different properties from the elements it's composed
18. Compounds can only be separated into elements by chemical reactions
19. A molecule is two or more non-metal atoms chemically joined together – this can be an element (e.g. H2) or a compound (e.g. H2O)

18. Naming compounds

20. There are rules to follow when naming compounds:
a. Usually the metal goes first and the non-metal goes second
b. If a metal and a non-metal react, the name of the non-metal ends in –ide
c. For some compounds, if there are a different number of atoms we add in 'mono' for 1, 'di' for 2 and 'tri' for 3
d. If the compound names ends in –ate then it usually contains three elements, including a non-metal and oxygen

19. Chemical formulae

21. Each element is represented by a chemical symbol.
e.g. Iron = Fe, oxygen = O, magnesium = Mg, gold = Au

22. The chemical formula of a molecule or compound tells you which elements and how many atoms of each are in one molecule
23. The small subscript number after an element symbol is the number of atoms of that element are in one molecule

e.g. In HNO_3 there is 1 atom of hydrogen, 1 atom of nitrogen and 3 atoms of oxygen per molecule.

Year 7 Science Spring Term - Gravity

Key Vocabulary:

1	**Accelerate**	When an object changes speed or direction.
2	**Asteroid**	A small, rocky object that orbits the Sun (smaller than planets).
3	**Astronaut**	A person who is travels or is trained to travel in space in a spacecraft.
4	**Attract**	When one object pulls another towards it.
5	**Contact Force**	A force that requires objects to be directly touching in order to have an effect.
6	**Eclipse**	When light to an object in space is blocked by another object.
7	**Galaxy**	A system of millions if stars, gas and dust, held together by gravity.
8	**Gravity**	The attractive non-contact force between all objects with mass.
9	**Gravitational Field Strength**	The force exerted per unit of mass (a measure of how 'strong' the gravity is.
10	**Lightyear**	The distance light can travel in one year.
11	**Mass**	The amount of matter in an object.
12	**Non-Contact Force**	A force that doesn't require objects to be directly touching in order to have an effect.
13	**Orbit**	The curved path of one object around another, usually a planet, moon or satellite.
14	**Satellite**	An object in space that orbits a planet.
15	**Universe**	All of space and time, including planets, starts, galaxies and all matter and energy.
16	**Weight**	The force of gravity acting on a mass.

17 Gravity

- Gravity can also be called **gravitational force.**
- **Gravitational forces act *on* and *between* all objects.**
- Gravity is a **non-contact** force.
- Non-contact forces have a force field that **weakens** with **distance.**
- The gravitational field strength decreases with distance.
- The gravitational field strength increases with mass.

18 Weight and Mass

- The unit of mass is kilograms (kg).
- Mass stays the same everywhere.
- **Weight** is the force of gravity acting on a mass.
- The unit of weight is Newtons (N).
- Weight = mass x gravitational field strength
  (N) (kg) (N/kg)

19 Space and Gravity

- Gravity is the force that holds objects in orbit.
- An orbit is the curved path of an object in space around another object in space.
- There are many billions of **galaxies** in the universe.
- Our solar system is a tiny part of one galaxy.
- The Universe is so large that distances are described in lightyears.
- A lightyear is the distance that light can travel in 1 year.

20 The Solar System

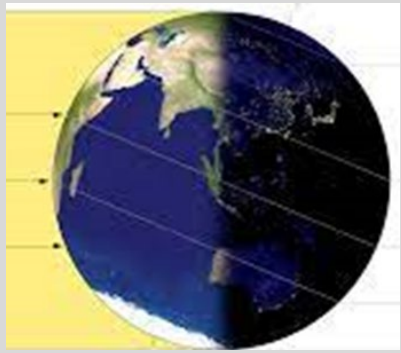
- Our solar system contains lots of objects including the sun, planets, satellites, asteroid belts and comets.
- The **sun** is the star at the centre of our solar system.
- The **planets** orbit the sun.
- The planets are in the order: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.

21 Satellites

- The **satellites** orbit planets, asteroid belts and comets.
- A natural satellite is a moon which orbits a planet.
- Artificial satellites include those that orbit the Earth for communication.

22 Day and Night and Seasons

- It takes the Earth **365 days** to orbit the sun once. This is a **year.**
- Planets rotate on their axis which produces day and night.
- The Earth rotates once every 24 hours.
- The seasons are caused because the Earth is tilted on an axis at 23.5°C.



23 Eclipses

- An eclipse is when the light to an object in space is blocked by another object.
- There are two types of eclipses; a solar eclipse and a lunar eclipse.
- A **solar eclipse** happens when light from the Sun is blocked from reaching parts of Earth. This happens when the **moon comes between** the sun and the Earth.
- A **lunar eclipse** happens when light from the Sun is blocked from reaching the moon by the Earth when the **Earth comes between** the moon and the sun.

Year 7 Science Autumn Term Knowledge Organiser Particles

Key Vocabulary:

1	**States of matter**	They are solids, liquids and gases.
2	**Melting**	A substance changes from a solid to a liquid.
3	**Freezing**	A substance freezes when it changes from a liquid to a solid.
4	**Melting Point**	The temperature at where the melting and freezing of a substance happens.
5	**Boiling**	A substance changes from a liquid to a gas.
6	**Condensation**	When a substance changes from a gas to a liquid.
7	**Boiling Point**	The temperature at which boiling and condensing happens.
8	**Diffusion**	Diffusion is the movement of particles from a high concentration to a low concentration.
9	**Independent Variable (IV)**	The variable you want to change/ investigate.
10	**Dependent Variable (DV)**	The variable you measure because it depends on the IV.
11	**Control Variable (CV)**	The variables you keep the same because they could affect the dependent variable.
12	**Density**	Defined as the mass per unit volume of a substance.
13	**Density**	Density = mass ÷ volume
14	**Volume**	Volume = mass x width x height

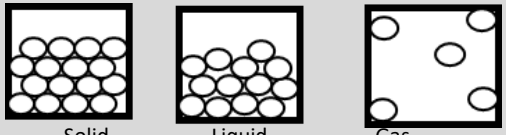
15 Properties of State of Matter

The three states of matter have different properties.

Property	Solid	Liquid	Gas
Does the object flow?	No	Yes	Yes
Can the object be compressed?	No	No	Yes
Does the object fill to fit the container?	No	No	Yes
Does the object have a fixed shape?	Yes	No	No
Does the object have a fixed volume?	Yes	Yes	No

16 The Particle Model

- All matter is made from tiny particles.
- The arrangement of particles affects the properties of the substance.
- The three states of matter can be represented by a simple model.



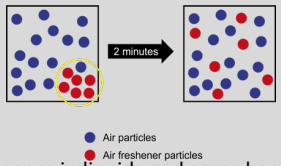
Solid Liquid Gas

- Particles in a solid are arranged in a regular pattern, touch each other and vibrate on the spot
- Particles in a liquid are arranged randomly, are touching and move freely
- Particles in a gas are arranged randomly, do not touch and move freely
- Some substances expand when heated. This is because when heated, particles have more energy. They vibrate more. The space between particles is bigger.

17 Changing State

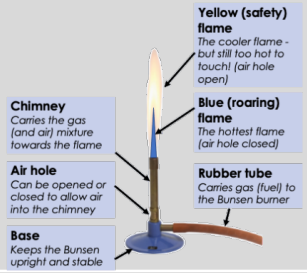
- When a solid melts, the particles gain **energy** from the surroundings, so they begin to **vibrate faster**. The particles move away from their places in the arrangement and start to move around more.
- When a liquid starts to freeze, its particles move more slowly as they **lose** energy to the surroundings. The particles form a **regular arrangement** and vibrate on the spot.
- During boiling, a liquid is heated. The particles gain energy. They move further apart. This forms a gas.
- During condensation, a gas cools. The particles lose energy. They move closer together until they are touching. This forms a liquid.
- When boiling occurs, Bubbles of the substance rise up to the surface and escape into the air.
- The particles in a solid can vibrate in a fixed position and cannot move from place to place because there are strong forces, which attract the particles towards each other
- The particles in a liquid are able to move around each other because the bonds are strong enough to keep the particles close together, but weak enough to let them move around each other

18 Diffusion



- Diffusion happens in liquids and gases because particles are free to move.
- Diffusion cannot happen in solids because particles in a solid are not free to move.
- Diffusion happens faster when the particles in a liquid or gas are moving faster after heating.

19 Heating Substances



20 Gas Pressure

- Gas pressure happens because of particles colliding with the walls of a container
- Increasing the size of the container decreases the gas pressure as there will be less collisions.
- Decreasing the size of the container increases the gas pressure as there will be more collisions.
- The deeper underwater you travel, the greater the pressure.
- The higher up you go into the atmosphere, the less the pressure.
- Greater pressure compresses gas particles so they are closer together and have a smaller volume.

21 Density and Volume

- If an object has an irregular shape, the volume can be measured using a displacement can, or Eureka can.
- The displaced water in the cylinder occupies the same amount of space as the irregular object. The volume of water in the graduated cylinder is equal to the volume of the object.

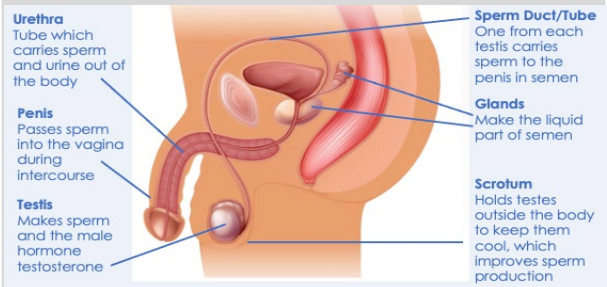
Year 7 Science Autumn Term Knowledge Organiser - Reproduction

Key Vocabulary:

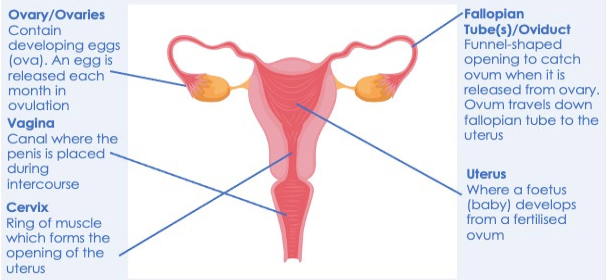
1	Asexual Reproduction	When an organism makes an exact copy of itself to make a new individual.
2	Sexual Reproduction	When sex cells from two individuals fuse to form a new individual
3	Gametes	Sex cells
4	Hormone	A chemical messenger transported in the blood
5	Ovulation	When an egg is released by the ovary
6	Fertilisation	When the gametes meet and the nuclei fuse to make a new cell
7	Implantation	When the embryo embeds into the uterus wall.
8	Amniotic sac	Contains fluid which protects the foetus from knocks and bumps
9	Placenta	Where the exchange of substances between the mother and embryo occurs
10	Umbilical cord	Connects the foetus to the placenta
11	Pollination	The transfer of pollen from the anther of one plant to the stigma of another plant
12	Germination	The process of a plant growing from a seed
13	Seed dispersal	Where seeds are transported away from the parent plant by various means; Animals externally (stuck to fur), animals internally (eaten), wind and explosion and water.

Reproductive Systems

14 Male Reproductive System



15 Female Reproductive System



16 Puberty

- The body goes through changes during puberty or adolescence (e.g. body and pubic hair grow).
- This prepares the body for sexual maturity and the production of gametes.
- These changes are controlled by sex hormones.
- A hormone is a chemical messenger transported in the blood

17 Menstrual Cycle

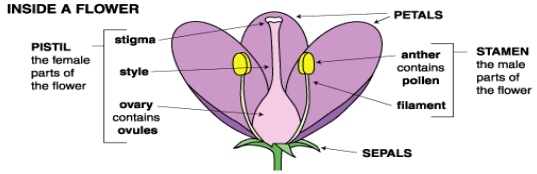
The female reproductive cycle is called the menstrual cycle.
The menstrual cycle prepares a woman's body for pregnancy.
The menstrual cycle is controlled by sex hormones.
On average, one menstrual cycle lasts 28 days.
Ovulation is when the egg is release.
Ovulation occurs on day 14.
The uterus lining builds up to allow the embryo to develop.
If fertilisation does not take place then the uterus lining is shed between days 1-5. This is called menstruation

Fertilisation and Sexual Reproduction in Plants

18 Fertilisation and Gestation

- Fertilisation is when the gametes meet and the nuclei fuse to make a new cell.
- After fertilisation, the cell multiplies to make an embryo.
- Implantation is when the embryo embeds into the uterus wall.
- After implantation, the embryo grows and develops into a foetus until it is ready to be born. This is called gestation.
- The amniotic sac contains fluid which protects the foetus from knocks and bumps.
- The placenta is where the exchange of substances between the mother and embryo occurs.
- The umbilical cord connects the foetus to the placenta.

19 Sexual Reproduction in Plants



- The male gamete is the pollen grain.
- Pollen is produced by the anther.
- The female gamete is the egg found in the ovule. The ovule is in the ovary.
- Pollination is the transfer of pollen from the anther of one plant to the stigma of another plant.
- Pollination can be carried out by insects, animals or the wind.
- Seed dispersal is needed so that the new plant grows far away from the parent plant so they don't compete for water and light.

Year 7 Science Summer Term Knowledge Organiser – Energy transfers

Key Vocabulary:		
1	**Calorie**	A unit of energy used to describe the energy content in food.
2	**Chemical energy**	A store of energy that is found in food, fuels and batteries.
3	**Degrees Celsius**	The unit used for temperature.
4	**Dissipate**	Spread out into the surroundings.
5	**Efficiency**	A measure of how much useful energy is transferred.
6	**Elastic potential energy**	A store of energy that is found in objects that can be stretched or compressed.
7	**Energy**	There are different stores of **energy**, such as potential energy and kinetic energy.
8	**Gravitational potential energy**	A store of energy that is found in objects at a height.
9	**Joule**	The SI unit of energy.
10	**Kilojoule**	1000 Joules.
11	**Kinetic energy**	A store of energy that any object or particle has when moving.
12	**Sankey diagram**	A diagram that shows the energy transfers taking place and their efficiency.
13	**Temperature**	Related to the average kinetic energy of particles
14	**Thermal energy**	A store of energy that any object with a temperature has.
15	**Thermal conductor**	A material that allows heat to move flow it quickly.
16	**Thermal insulator**	A material that does not allow heat to flow through it quickly.

Energy

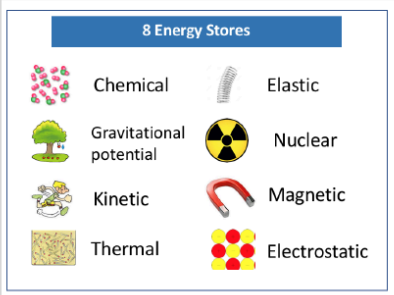
17

1. Energy cannot really tell us how things work.
2. Energy can only tell us if things are possible to do.
3. Energy is measured in joules (symbol J).
4. One joule is quite a small amount of energy.
5. One kilojoule, 1 kJ = 1000 J (one thousand joules)
6. One megajoule, 1MJ = 1000 kJ = 1,000,000J (one million joules)

18 Energy stores

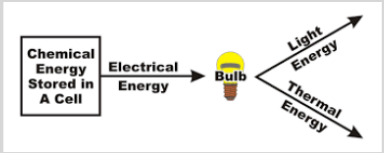
Energy can be stored in different ways, including:

- Moving things have a kinetic energy store
- High up things have a gravitational potential energy store
- Stretched, twisted or bent things have an elastic potential energy store
- Hot things have a thermal energy store
- Certain chemicals, like fuels or batteries, have a chemical store

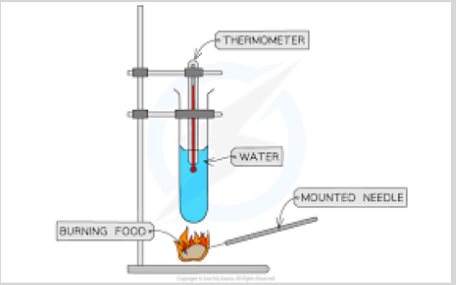


19 Energy Transfers

- Energy can be shifted from one store to another by physical processes (like forces or electric currents).

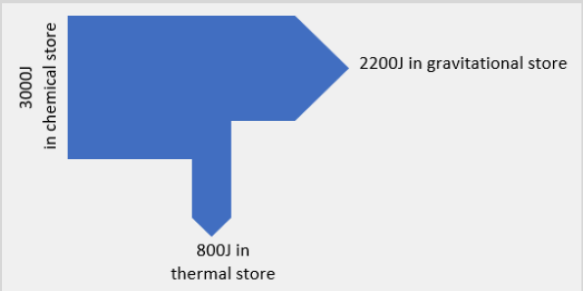


20 Energy in food



- 1 food calorie is approximately 4 200J.
- Different foods contain different amounts of energy – food labels can tell us how much.

Thermal conductors are materials that allow heat to flow through them easily.
Thermal insulators are materials that do not allow heat to flow through them easily
Metals tend to be good conductors.
Non-metals tend to be good insulators.



Year 7 Science Summer Term Knowledge Organiser – Interdependence

Key Vocabulary:

1	**Abiotic Factor**	Something that is not to do with a living thing. *Light, temperature and water availability are all **abiotic factors**.*
2	**Biotic Factor**	**Something to do with a living thing.** *Food availability, disease and predators are all **biotic factors.***
3	**Community**	Two or more populations of organisms in the same habitat. *A group of seals and sharks form **community** in the ocean.*
4	**Competition**	Where organisms need a resource that has a limited supply. In the desert habitat, there is competition between plants for water.
5	**Interdependence**	All the organisms in an ecosystem depend on each other. ***Interdependence** involves feeding relationships, pollination and decomposition.*
6	**Quadrat**	A piece of equipment used to count the number of organisms/individuals in a specific area. ***Quadrats** are used during both random and systematic sampling to count the individuals in an area.*
7	**Secondary Consumer**	An organism that feeds on a primary consumer. *A fox is a **secondary consumer** because it eats rabbits, who eat grass.*
8	**Tertiary Consumer**	An organism that feeds on a secondary consumer. *A hawk is a **tertiary consumer** because it eats sparrows, who eat caterpillars.*
9.	**Trophic Level**	An organism's position in a food chain. *A producer is always found at the first **trophic level** as they are at the beginning of a food chain.*
10.	**Sample**	A smaller part of something that gives an idea of the whole.

11 Ecosystems

community of organisms with the non-living parts (abiotic factors) of their habitat. *E.g. a rainforest ecosystem contains: gorillas, ants, nut trees, lots of water and lots of sunlight*

A population is a group of the same organism. *E.g. a group of gorillas*

A community is made of several different populations living in the same area that depend on each other for survival. *E.g.* populations of: gorillas, ants and nut trees.

12 Sampling

Random sampling is used to estimate the size of a population in a habitat

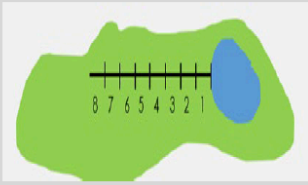
Quadrats are placed randomly and used to count the number of individuals in a specific area

e.g. estimating the total number of daisies in a field

Systematic sampling is used to investigate the effect of a factor on the distribution of organisms

This involves using quadrats placed at regular intervals along a transect line

e.g. counting the number of daisies as you move further away from a pond



13 Food Chains and Webs

Feeding relationships within a community can be represented by food chains and food webs

The direction of the arrow in a food chain and food web shows the direction of energy transfer.

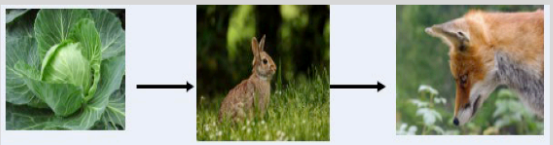
Producers are plants that can make their own food (glucose) using sunlight in the process of photosynthesis

Primary consumers eat producers, secondary consumers eat primary consumers and tertiary consumers eat secondary consumers

Predators are consumers that eat other animals, called prey

In a stable community the numbers or predators and prey increase and decrease in cycles

If there is a change in one population then this affects other populations in the community. You can use a food web to predict what changes could happen



14 Abiotic and Biotic factors

Biotic factors are living things that can affect a community

Examples of biotic factors are: food, disease and predators

Abiotic factors are non-living things that can affect a community

Examples of abiotic factors are: temperature, light, wind, amount of water

15. Competition

Animals often compete with each other for space, mates and food

Plants often compete with each other for space, water, minerals and light

The best competitors are most likely to survive

Year 7 Summer Knowledge Organiser Mixtures

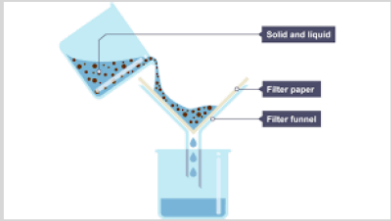
Key Vocabulary:

1	Solute	A substance that can be dissolved in a solvent. *Salt is a **solute** because it can be dissolved in water.*
2	Solvent	A substance in which a solute can dissolve *Water is a **solvent** because salt can dissolve in it.*
3	Solution	A mixture of a dissolved solute and a solvent. *A **solution** of salt and water was used.*
4	Insoluble	A substance is insoluble if it cannot be dissolved in a solvent. *Wood is **insoluble** in water.*
5	Unsaturated solution	A solution which has the maximum possible amount of solute dissolved in it. *The student continued to add salt to the water until no more would dissolve and she had made a **saturated solution**.*
6	Boiling point	The temperature at which a substance changes state from liquid to gas. It is also the temperature at which a substance changes from gas to liquid (condenses). *The **boiling point** of water is 100 degrees Celsius.*
7	Melting point	The temperature at which a substance changes from solid to liquid (melts). It is also the temperature at which a substance changes from liquid to solid (freezes). *The **melting point** of water is 0º Celsius.*

Separation techniques

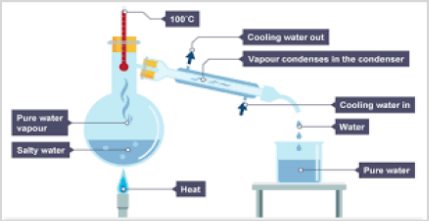
8 Filtration

Filtration is used to separate an insoluble solid from a pure liquid or a solution eg sand from water.



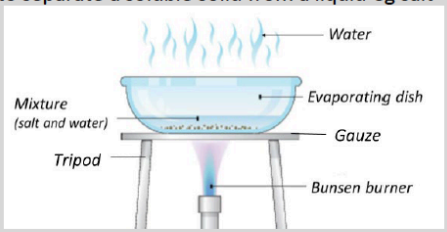
9 Distillation

Distillation is a separation technique used to separate a solvent from a mixture eg water from a salt solution.



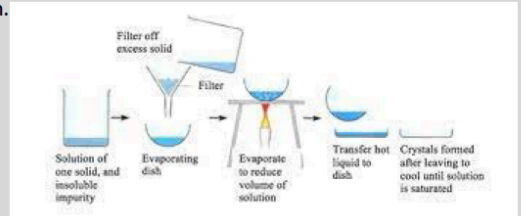
10 Evaporation

Evaporation describes the process of a liquid turning into a gas, is used to separate a soluble solid from a liquid eg salt from water.



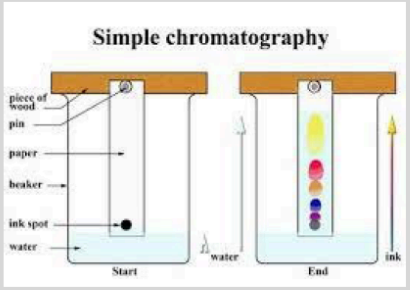
11 Crystallisation

Crystallisation is used to produce solid crystals from a solution eg copper sulphate crystals from copper sulphate solution.



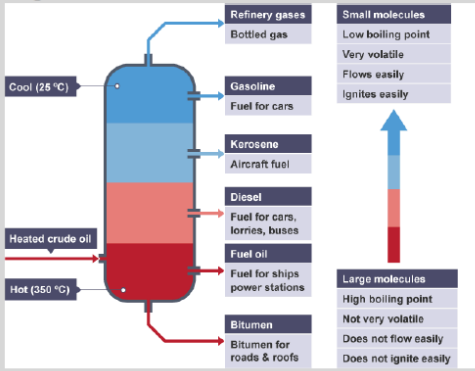
12 Chromatography

Paper **chromatography**. is used to separate mixtures of soluble substances eg inks and dyes.



13 Fractional distillation

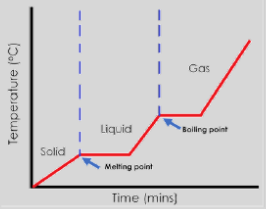
Fractional distillation is used to separate different liquids from a mixture of liquids. It is useful for separating ethanol from a mixture of ethanol and water.



Pure and impure substances

14 Pure and substances

Pure substances melt and boil at specific temperatures.



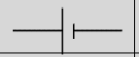
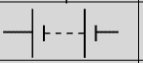
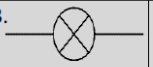
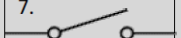
Mixtures melt and boil at a range of temperatures.

Year 7 Science Summer Term Knowledge Organiser – Electrical Circuits

Key Vocabulary:

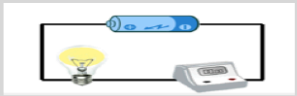
1	**Ammeter**	A component used to measure current in electrical circuits, connected in series.
2	**Ampères (Amps)**	The unit of measurement for current.
3	**Battery**	Two or more cells connected together.
4	**Cell**	A single energy source that can be used to power an electrical circuit, two or more of which can be connected together to make a battery.
5	**Charge**	Particles that transfer energy in an electrical circuit.
6	**Component**	Any device in an electrical circuit.
7	**Current**	The rate of flow of charge.
8	**Electrical Conductor**	A material that allows current to flow through it easily.
9	**Electrical Insulator**	A material that does not allow current to flow through it easily.
10	**Energy**	The ability or capacity to do work (such as move an object through a distance).
11	**Junction**	A point in a parallel circuit where the current can split.
12	**Parallel**	A circuit in which there is more than one branch through which current can flow.
13	**Series**	A circuit in which there is only one branch through which current can flow.
14	**Switch**	A component that can be open or closed to control whether or not current can flow.
15	**Voltage**	The amount of energy shifted from the power source to the moving charges or from the charges to the component.
16	**Voltmeter**	A component used to measure voltage in electrical circuits, connected in parallel.
17	**Volts**	The unit of measurement for voltage.

18 Circuit Components

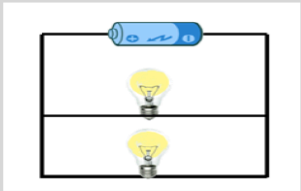
Circuit Symbol	Component Name	Function
1. 	Cell	Push charges around the circuit. Supplies electrical energy
2. 	Battery	
3. 	Bulb/Lamp	Lights up
4. 	Ammeter	Measures current
5. 	Voltmeter	Measures voltage
6. 	Motor	Spins around or moves
7. 	Switch	Completes the circuit
8. 	Buzzer	Makes a sound

19 Series & Parallel Circuits

A complete circuit has no gaps, so the electricity can flow all around in a loop.
If the circuit is incomplete, the electricity cannot flow.
If all of the components are connected into one main loop, it is a series circuit.



If there's more than one loop with junctions, it's a parallel circuit

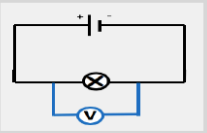


20 Current

1. Current is the rate of flow of charge and is measured in Amperes/Amps (A) by an Ammeter.
2. Ammeters are placed in series.
3. Current transfers energy from one place to another.
4. Current can be calculated using the equation:
   Current=Charge/Time
5. Charge is measured in Coulombs (C) and time is measured in seconds (s).
6. The brightness of a bulb is increased by adding cells/ batteries and decreased by adding more bulbs (components).
7. Current is the same everywhere in a series circuit.
8. Current splits at the junctions in a parallel circuit.

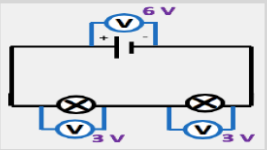
21 Voltage

Voltage is measured in Volts (V) by a Voltmeter.
Voltmeters are connected in parallel.



Voltage is the amount of energy shifted from the power source to the moving charges, or from the charges to the circuit component.

- Adding voltage (adding batteries) increases the current and increases the brightness of bulbs.
- The voltage in a series circuit is shared between components.



The voltage across the cell is equal to the voltage on each pathway of a parallel circuit.