Year 7 Science Revision

This booklet contains all the content from the Health and Disease, Particles and Structure, Substance and Properties, Forces and Science Skills topics. There are activities throughout the booklet and you can also use the information to create your own revision resources too. Highlight/underline the key information, annotate it and identify your strengths and weaknesses.

Health and Disease
- Types of health
- Diet and exercise
- Pathogens

Particles and Structure
- Particle models
- Atoms and molecules
- Symbols and formula
- Polymer properties
- Chemical reactions
- Evaporation

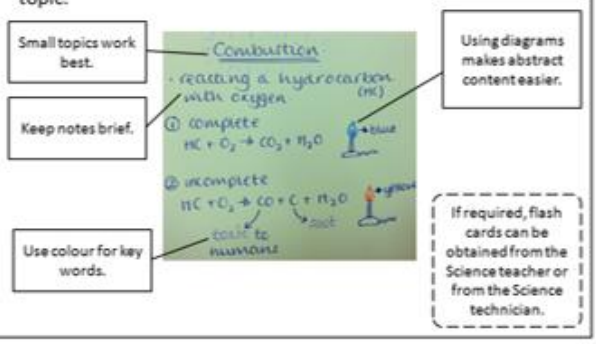
Substance and Properties
- Classifying materials
- States of matter
- Solutions, separation and solubility
- pH scale
- Physical properties

Forces
- Describing and types of forces
- Friction

Investigative skills
- Lab equipment
- Methods
- Tables and units
- How to interpret data and graphs
- Variables
- Risk assessments

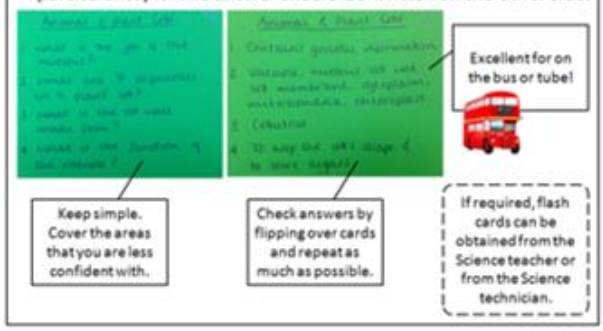
Flash Cards

- Use small pieces of card or paper to make concise notes on a topic.

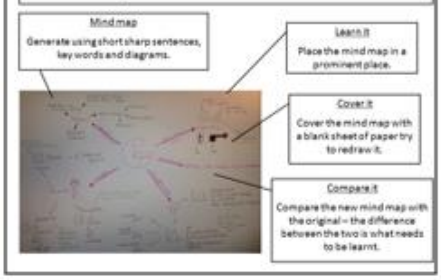


Q&A Cards

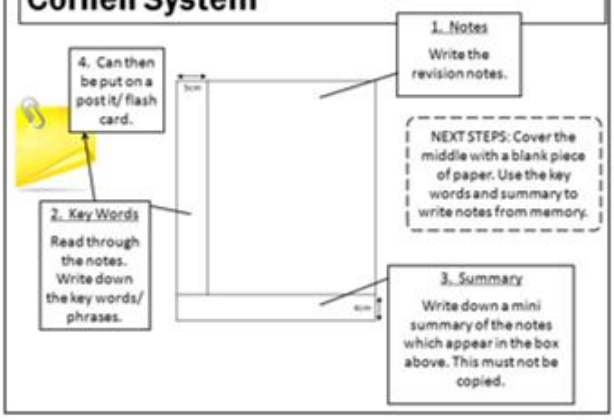
- Use small pieces of card or paper to write questions on a particular topic. The answer should be written on the other side.



Mind Maps



Cornell System



ARTICLE 28 – RIGHT TO EDUCATION: Every child has the right to an education.

Chestnut Grove Academy

BHD: Health and Disease

What's the big idea?

Organisms must stay in good health to survive and thrive; the health of an individual organism results from interactions between the organism's body, behaviour, environment and other organisms.

Topic BHD1	Topic BHD2	Topic BHD3
What are health and disease?	**Human lifestyles and health**	**Health and infectious disease**
Key concepts:	Key concepts:	Key concepts:
BHD1.1 Good and ill health	BHD2.1 Diet and exercise	BHD3.1 Pathogens
BHD1.2 Disease		BHD3.2 Preventing infection

Science story

Health

The physical and mental health of an individual organism result from interactions between the organism's body, behaviour, environment and other organisms. Changes in the normal appearance, functions and behaviour of an organism can be signs or symptoms of ill health. The good health of all organisms can be compromised by disease. Diseases can be caused by germs, lifestyle, environment, and information in the genome. Some factors increase or decrease the risk of disease. Diseases caused by bacteria and fungi can be treated using antimicrobial medicines, but diseases and ill health caused by other factors, including viruses, cannot.

Human Lifestyles and Health

Humans need to eat a diet made up of appropriate amounts of carbohydrates, lipids (fats and oils), proteins, vitamins, minerals, dietary fibre and water. Eating too much or too little of particular foods can increase the risk of physical and mental ill health. Humans also need appropriate amounts of exercise, which has short-term and long-term effects on the body, including the gas exchange system and the circulatory system. To stay in good health, an individual must maintain a balance between the amount of food they eat (their energy intake) and the level of activity (which requires energy) in their daily life. Variation between individuals and their lifestyles, including how active they are, affects their dietary requirements. Making changes in lifestyle and behaviour, such as diet and exercising, can help to reduce the risk of ill health.

Infectious Disease

The health of humans, other animals and plants can be affected by diseases caused by infection by pathogens, including viruses, and some bacteria and fungi. Pathogens are usually too small to be seen without a microscope. Microorganisms are present on and in the human body all the time; most are not pathogens, and some form part of our defences against pathogens. Symptoms of disease appear when the body's cells or systems have been damaged or are not working normally. An organism may not

always show symptoms after infection with a pathogen; pathogens only cause symptoms when they are present in sufficient numbers. Humans have non-specific defences against pathogens, including physical defences (skin, mucus, and blood clots to seal wounds), chemical defences (stomach acid, and antimicrobial substances in saliva, mucus and tears), and microbial defences (bacteria on the skin and in the gut). The spread of pathogens that cause diseases in humans, and the risk of infection, can be reduced by practices including effective hygiene and sanitation, proper storage and preparation of food, vaccination, and use of contraception during sexual activity. Plants have non-specific defences against pathogens, including physical defences (waxy cuticle and cell walls) and chemical defences (antimicrobial substances). The spread of pathogens that cause diseases in plants, and the risk of infection, can be reduced by practices including regulating the movement of plant material, polyculture farming, crop rotation, and chemical and biological control.

CPS: Particles and Structure

What's the big idea?

All matter is made up of atoms. The collective, structural arrangement and behaviour of the atoms explains the properties of different substances.

Topic CPS1
Substances and mixtures

Key concepts:
- CPS1.1 Particle model for the solid, liquid and gas states
- CPS1.2 Particles in solutions

Topic CPS2
Elements and compounds

Key concepts:
- CPS2.1 Atoms and molecules
- CPS2.2 Symbols and formulae

Topic CPS3
Chemical change

Key concepts:
- CPS3.1 Rearrangement of atoms

Topic CPS4
Understanding chemical reactions

Key concepts:
- CPS4.1 Representing reactions
- CPS4.2 Conservation of mass

Topic CPS5
Evaporation

Key concepts:
- CPS5.1 Explaining evaporation

Topic CPS6
Periodic table

Key concepts:
- CPS6.1 Atomic model

Science story

Particle Model

All matter is made up of particles. The arrangement and movement of these particles is described by the particle model. This model can be used to explain observed changes of state. In order to account for differences between the melting and boiling point of substances the particle model must be extended to include consideration of the attractive forces between the particles. The particle model can also explain why a clear solution is formed when a substance dissolves.

Elements and Compounds
All matter is made up of atoms. Each element is made up of a different type of atom. A single atom does not have the properties of that element. The properties of an element arise due to the arrangement and behaviour of the atoms collectively. A compound is made up of two or more types of atom joined together. As different atoms are joined than in the separate elements, the compound has properties that are distinct from the elements that are made up of its constituent atoms. Elements and compounds have one of two types of basic structure. Some are made up of separate groups of two or more atoms (molecules) whereas the atoms in others are joined to make one giant structure. These structures influence properties such as melting and boiling points because there are weaker forces between molecules than within molecules. The element symbols that form part of a chemical formula represent the types of atom that make up that particular compound. The numbers in a chemical formula show the ratio of these different types of atom. For molecular substances, the number in a formula also gives the number of each type of atom in a molecule.

Chemical Change
During a chemical reaction, atoms are rearranged and therefore a new substance (or substances) is formed with different properties to the reactants.

Understanding Chemical Reactions
Chemical reactions are represented by chemical equations. A word equation summarises the reactants and products of a reaction. A symbolic chemical equation provides not only qualitative information about the substances in the reaction, but also quantitative information relating to the both the substances and the ratio in which they react. State symbols are used to indicate whether substances are in the solid, liquid or gas state or if they are dissolved in water (aqueous). For any chemical reaction, the total mass of the reactant substances is equal to the mass of the products. Mass is conserved. Mass is conserved because during a chemical reaction the atoms are rearranged. No new atoms are created and none are destroyed. A symbolic chemical equation must therefore be balanced so that the number of atoms of each type are the same on both sides of the equation. If a reaction takes place in an open system and a product is in the gas state, then this product is able to escape. The measured mass will therefore decrease.

Evaporation
The atoms (or molecules) that make up a substance are constantly moving but they do not all have the same kinetic energy. There is a distribution of energies. Some atoms (or molecules) will have enough energy to overcome the forces of attraction holding the atoms (or molecules) together and escape to mix with the air. This allows evaporation to take place below the boiling point of a substance.

Periodic Table
An individual atom is itself made up of even smaller particles. The atomic model describes an atom as consisting of a central nucleus (made up of protons and neutrons) surrounded by electrons.

CSU: Substance and Properties

What's the big idea?

All materials are made up of either a single substance or a mixture of substances. These substances may be elements or compounds. Substances have distinctive properties that may be used to identify them or separate them from a mixture. A solution is a mixture of two (or more) substances, the solute(s) and the solvent.

Topic CSU1
Substances and mixtures
Key concepts:
CSU1.1 Substance
CSU1.2 Solutions
CSU1.3 Separating solutions

Topic CSU2
Solubility
Key concepts:
CSU2.1 Comparing solubility

Topic CSU3
Acids and alkalis
Key concepts:
CSU3.1 pH scale

Topic CSU4
Periodic table
Key concepts:
CSU4.1 Trends in physical properties

Science story

Substances and Mixtures
All materials are made up of either a single substance, or a mixture of substances. A substance has a characteristic sharp melting and boiling point which determines its state at room temperature. One substance can exist in either the solid, liquid or gas state depending upon the temperature. A pure sample of a substance consists of only that substance whereas an impure sample is a mixture containing one or more additional substances. An impure sample of a substance melts over a temperature range. Melting point can therefore be used to distinguish a pure sample of a substance from an impure sample. Some substances dissolve in a particular solvent and some do not. A substance can be said to be soluble or insoluble in that solvent. The solution formed is a mixture of the solute and the solvent. Although the solute cannot be seen it is still present. The properties of different substances may be used to separate a mixture using an appropriate practical technique.

Solubility
There is a maximum mass of a substance (solute) that will dissolve in any given volume of solvent. A solution in which no more solute will dissolve is called a

saturated solution. Solubility can change with temperature therefore the solubility of a particular substance is defined at a specific temperature. Graphical data on solubility can be used to predict macroscopic observations of solutions in terms of whether the solute will appear fully dissolved.

Acids and Alkalis
Acids and alkalis are both types of aqueous solution with specific chemical properties. They are indistinguishable by observation as they form colourless solutions. The colour change of litmus indicator may be used to find out whether a solution is acidic or alkaline. The pH scale indicates how acid or alkaline a solution is.

Periodic Table
Within the Periodic Table there are both horizontal and vertical trends in physical properties of the elements. Metals are located on the left and non-metals on the right. Elements within the same vertical group may have similar physical properties (for example they may all conduct electricity) but also show differences including in melting and boiling point. Understanding of these trends allows predictions to be made about unfamiliar elements.

PFM: Forces and Motion

What's the big idea?

Force is a useful idea because it is the key to explaining changes in the motion of an object or in its shape. The motion of an object can be explained or predicted if you know the sizes and directions of all the forces that act on it. Understanding forces helps us to predict and control the physical world around us.

Topic PFM1
Forces

Key concepts:

1.1 What forces do
1.2 Describing forces
1.3 Balanced and unbalanced forces
1.4 Friction
1.5 Energy stores and transfers

Topic PFM2
Moving by force

Key concepts:

2.1 Describing speed
2.2 Motion graphs
2.3 Changing motion
2.4 Drag

Topic PFM3
More about force

Key concepts:

3.1 Mass and weight
3.2 Hidden forces
3.3 Turning effects

Science story

Forces and Interaction
Forces arise when two objects interact. They may interact by direct contact, or 'at a distance' (for example, two magnets, or electric charges, or masses). When two objects interact, a force is always exerted on both of them. Object A exerts a force on object B, and object B exerts a force on object A. Forces always arise in pairs. At every instant during the interaction, the force exerted by object A on object B is equal

in size and opposite in direction to the force exerted by object B on object A. Forces arising from direct contact act only while the two objects are touching. 'Action at a distance' forces get weaker, the further the two objects are apart.

Representing and Measuring Forces

An arrow is a useful way to indicate on a diagram the direction of any force that is acting on an object. The arrowhead shows the direction in which the force acts on the object. The tip or the tail of the arrow shows the point on the object at which the force acts (it does not matter which is used; the meaning is the same). A force is always exerted by something, and always acts on something. The clearest way to label a force arrow is: force exerted on [object A] by [object B]. The size of a force (in newton, N) can be measured. In everyday situations, this can often be done using a spring balance or a top-pan balance. Often more than one force acts on an object. The net effect of two forces acting in the same straight line (same direction, or exactly opposite directions) is found by adding them, taking account of their directions.

Identifying and Naming the Forces in Everyday Situations

In everyday situations, a driving force is needed to start an object moving, and to keep it moving. This can come directly from a person or animal or machine pushing or pulling it, or can arise indirectly through a more complicated set of actions (e.g. pedalling a bicycle; the engine of a car turning the driving wheels; the engine of a boat turning a propeller, etc.). When a moving object slides over a fixed surface, or is pushed or pulled so that it tends to slide over it, a force of friction acts on the object in the direction opposite to its motion. The friction force is exerted by the surface which the object is sliding (or tending to slide) over. When an object moves through a fluid (a liquid or a gas), a drag force acts on it in the direction opposite to its motion. If the driving force acting on an object stops, friction and/or drag forces will make it slow down until it stops. In everyday situations, a downward force acts on every object, due to the gravitational attraction of the Earth. This is called its weight. It can be measured (in N) using a spring (or top-pan) balance. If an object is immersed in, or floats on, a fluid, the fluid exerts an upward force on the object which is called upthrust.

The Link Between Force and Motion

To explain the motion of an object, it is essential first to identify all the forces acting on that object. From this, we can then work out the net force acting horizontally and/or vertically on the object. Stationary objects: If an object is not moving (stationary), the net force acting on it is zero. Usually this is because several forces act on it, which add to zero (they cancel each other out). So, for example, if an object is being pushed, but is not moving, the friction force is equal to the applied push. If an object is sitting on a level surface, the normal reaction of the surface is equal to its weight. If an object is hanging from a string, the tension of the string is equal to its weight. If an object is floating on a liquid, the upthrust is equal to its weight. Changing motion: If a non-zero net force acts on a stationary object, the object will

start to move in the direction of the force and its speed will steadily increase. If a non-zero net force acts on a moving object in the same direction as its motion, the speed of the object will steadily increase. If a non-zero net force acts on a moving object in the opposite direction to its motion, the speed of the object will steadily decrease. If its speed falls to zero, and the force continues to act, the object will then start to move in the direction of the force, with a steadily increasing speed. In all cases, the bigger the net force, the greater the rate of change of motion (for a given object). And the bigger the object, the smaller the rate of change of motion. Uniform motion: If an object is moving at a steady speed in a straight line, the net force acting on it is zero. A net force is needed to change the motion of an object, but not to maintain motion at a uniform speed.

Friction and Drag

The friction force acting an object is caused by the unevenness at a microscopic level of the surfaces in contact. This leads to a force along the line of the interface, when an applied force makes an object slide (or tend to slide) over another object. Friction can be reduced by using a liquid (a lubricant) to fill the tiny surface irregularities. For a given object on a given surface, the friction force balances (cancels) the applied force that is trying to slide one object over the other, up to a limit (which depends on the weight of the object and on the surfaces in contact). If the applied force exceeds this limit, the object will start to move. Once an object starts to slide, the friction force acting on it remains the same size, regardless of its speed. The drag force on an object moving through a fluid increases with its speed. The size of the drag force can be reduced by giving the moving object a streamlined shape.