# KESTEVEN AND SLEAFORD HIGH SCHOOL

## Science Scheme of Learning

## Year 8 – Term 1/Units 7

**Intent – Rationale**

This topic features the building blocks to some key topics within Biology , Chemistry and Physics.
In Biology students learn about the respiratory system in humans and how we breath, students will also study the circulatory system. This topic features two of the key systems within the human body.
In chemistry, students study the history of the periodic table, allowing them to see how spotting patterns is key to scientific thinking. They will learn about how the modern day periodic table is arranged and how electron configuration affects properties than elements have.
In Physics, students will learn several key equations in the electricity topics, learning how to manipulate and apply them to situations.

| Sequencing – what prior learning does this topic build upon? | Sequencing – what subsequent learning does this topic feed into? |
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| **Builds upon prior learning from Ks1 and Ks2 National curriculum**<br><br>**Builds upon the following topics from year 7:**<br>**Topic 1 Bio Cells and Tissues**<br>**Topic 2 Chem Atoms and Elements**<br>**Topic 3 Phys Electricity** | Biology – Leads to GCSE Topic B9 Respiration<br>Chemistry – Leads to GCSE Topic 1 Atomic structure and perodic table<br>Physics – Leads to GCSE topic P5 Electricity in the home, P4 Electricity |
| **What are the links with other subjects in the curriculum?** | **What are the links to SMSC, British Values and Careers?** |
| • | B8.7 L1 The breathing system GB4a<br>B8.7 L2 Gas Exchange SP2<br>C8.7 L2 Spotting Patterns GB4e<br>C8.7 L3 Developing the periodic table GB4d<br>C8.7 L4 Predicting Patterns GB4a<br>P8.7 L3 Paying for Electricity SO3 |
| **What are the opportunities for developing literacy skills and developing learner confidence and enjoyment in reading?** | **What are the opportunities for developing mathematical skills?** |
| FROM THE LIBRARY<br>*The Body;* Kathryn Senior-612<br>*Breathing;* J. Johnson-612.2<br>*Dictionary of Human Anatomy*; DK eye witness-612<br>*The Elements*; Dan Green-546<br>*Periodic Table*; Brian Knapp-546<br>*The Periodic Table*; JSF.Pode-541<br>*The Periodic Table*; P.Levi-FIC L<br>*Electricity*; Steve Parks-537<br>E*lectricity*; Louise Spilbury-537<br>*Electricity and Power*; Peter Riley-537<br>*Shocking Electricity*; Nick Arnold 530 | • students will learn several key equations in the electricity topics, learning how to manipulate and apply them to situations. |

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| Frankenstein; Mary Shelley-FIC S | |

# Science Scheme of Learning

# Year 8 – Term 1/Units 7

## Intent – Concepts

**What knowledge will students gain and what skills will they develop as a consequence of this topic?**

### Know

Identify the groups and periods on the Periodic Table
State that opposite charges attract and negative charges repel
Recall the equation that links charge, current and time
Recall the equation that links power, current and voltage
Recall the equation that links energy, power and time

### Apply

Describe that elements in the same group have similar properties
Describe how the electron structure of an atom is linked to its chemical properties and its place on the Periodic Table
Describe how some metals react with cold water and link this to their electron configuration
Describe how ideas about classifying elements changed over time
Describe the main contributions made by Döbereiner, Newlands and Mendeleev
Describe the properties of the elements in group 7
Describe the symptoms of asthma
Describe how gases diffuse to and from our blood in our lungs
Describe how gas exchange occurs in other organisms
Describe how we breathe
Describe the structure of the heart and how it works
Describe the four components that make up our blood
Describe the structure of the breathing system
Describe how some objects can be charged by friction
Describe how lightning is generated in a storm cloud
Use the equation that links charge, current and time
Calculate the cost of domestic electricity

### Extend

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Make predictions about an unknown element from its position in the periodic table
Explain how the breathing system is adapted
Use and rearrange the equation that links power, current and voltage
Use and rearrange the equation that links power, energy and time

| What subject specific language will be used and developed in this topic? | What opportunities are available for assessing the progress of students? |
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| **Abdomen** | In mammals, this is the lower part of the torso (body). The abdomen starts below the diaphragm, which separates the abdomen from the thorax (chest). The abdomen finishes with the pelvis. |
| **Alveolus (plural alveoli)** | A single air sac in the lungs where gaseous exchange takes place between the blood and the air in the lungs. Alveoli are arranged in clusters, fed by small tubes called bronchioles. The alveoli have a massive surface area to ensure the maximum amount of gas exchange can take place. They are fed by a good blood supply, are moist and have very thin walls. All of these factors ensure maximum gas exchange. |
| **Asthma** | A long-term disease of the respiratory system that causes coughing, wheezing and difficulty in breathing. This is because the lining of the airways swells and becomes irritated. Asthma attacks can be triggered by a number of factors, including dust, exercise, panic and the cold. People who are asthmatic often treat attacks using an inhaler. |
| **Breathing** | The movement of the chest and diaphragm as a result of muscular contraction, which causes air to be drawn into the lungs for gaseous exchange and then pushed out of the lungs in a repetitive cycle. Breathing must not be confused with respiration. |
| **Bronchiole** | A narrow air passage in the lungs that branches off a bronchus and carries air to and from the alveoli. |
| **Bronchus (plural bronchi)** | One of two tubes that splits from the trachea and carries air to and from one of the two lungs. |

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| **Coronary arteries** | The arteries that carry blood to the heart muscle itself. Like all muscle tissue, the heart needs a good supply of oxygen and glucose, and these are carried by the coronary arteries. A clot that finds its way into a coronary artery will cause a blockage, and this results in a heart attack. |
| **Deoxygenated blood** | Blood that is low in oxygen. This is usually because it has given the oxygen it was carrying to tissues that needed it for respiration, for example muscle or brain cells. The deoxygenated blood returns to the right side of the heart via the veins. It is then pumped to the lungs via the pulmonary artery, where it is re-oxygenated. |
| **Diaphragm** | A sheet of muscle that separates the thorax (chest) from the abdomen. It is responsible for the mechanism of breathing when you are not exercising. As it contracts, it flattens and this increases the volume inside the chest, decreasing the pressure and drawing air into the lungs. During exercise, the diaphragm works in the same way, but muscles in the ribcage also work, lifting the ribs to further increase the volume of the chest. |
| **Diffusion** | Movement of particles from an area where they are in high concentration to an area where they are less concentrated. |
| **Gas exchange** | In the lungs, gas exchange takes place across the respiratory membrane of the alveoli. Oxygen passes from the air into the blood, and carbon dioxide moves in the opposite direction.<br>In plants, gas exchange takes place when carbon dioxide diffuses into the leaf through the stomata. Oxygen is able to diffuse out of the leaf through the stomata during daylight. |
| **Goblet cell** | A cell found in several places inside the body that produces mucus.<br>For example, goblet cells are found in the lining of the trachea, the nose, the upper eyelid and the stomach and intestines. |
| **Heart** | The muscular organ that pumps blood around the body and to the lungs. The human heart has four chambers. The upper chambers (called atria) collect blood returning to the heart. The lower chambers are more muscular and contract to pump blood out of the heart. The right side of the heart pumps deoxygenated blood to the lungs, whereas the separate left side of the heart pumps oxygenated blood to the other body tissues. |
| **Lungs** | The respiratory organs in mammals, reptiles and birds. They are found in the thorax (chest) and are where gaseous exchange takes place. In the lungs, oxygen moves from the air into the blood, whereas carbon dioxide moves from the blood to the air. |
| **Mucus** | A thick sticky liquid that is produced by specialised cells inside the body. Mucus contains mainly water, with some proteins and carbohydrates.<br>Mucus is produced in the nose, and in the linings of the airways, intestines and vagina. |
| **Oxygenated blood** | Blood that is rich in oxygen. Oxygenation takes place in the lungs, so oxygenated blood will be found in the pulmonary vein and the main arteries of the body (except the pulmonary artery). Oxygen binds to haemoglobin in the red blood cells. |
| **Plasma** | The liquid component of blood that carries dissolved chemicals such as hormones, carbon dioxide and glucose. Plasma is made up of water (92%) and contains dissolved proteins as well as other chemicals. |
| **Platelets** | Fragments of cells in the blood that help to form a clot if a blood vessel is damaged. |
| **Red blood cells** | The specialised cells in vertebrates that carry oxygen around the body. These cells have a biconcave shape, which is like a ring doughnut with the hole filled in by a thin membrane. They have no nucleus, so they can contain as much haemoglobin in the cytoplasm as possible. Oxygen molecules stick to haemoglobin, which is a protein molecule that contains iron. |
| **Thorax** | The upper part of the torso (body), which contains the heart and lungs. The lowest point of the thorax is the diaphragm muscle. Below the diaphragm is the abdomen. |
| **Trachea** | The tube that carries air to and from the lungs. The trachea is strengthened with C-shaped pieces of cartilage, which you can feel as ridges if you run your finger down the front of your neck. These prevent the trachea from collapsing under the low pressure generated by your breathing movements. |
| **White blood cells** | Cells that are found in the blood and play an important role in the immune system.<br>There are many types of white blood cell. Two are phagocytes and lymphocytes. |

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| **Atom** | The smallest particle of an element. An atom contains a central nucleus (which holds protons and neutrons) and this is surrounded by electrons orbiting in shells (or energy levels). |
| **Effervescence** | Bubbles coming out of a solution, as can be seen when the lid is undone on a bottle of fizzy drink. |
| **Element** | A pure substance made from only one type of atom. There are approximately 100 elements and they are listed in the Periodic Table. |
| **Properties** | The characteristics of a substance that make it well suited (or poorly suited) for a particular purpose. |
| **Subatomic** | Smaller than an atom, or part of an atom. There are three subatomic particles: protons and neutrons are found in the nucleus, and electrons are found orbiting the nucleus |
| **Charging by friction** | When an electrostatic charge is built up on an insulator due to a rubbing motion. The friction between the objects causes electrons to be ripped off the atoms of one object, making it positively charged. These electrons are added to the other object, making it negatively charged. |
| **Charging by induction** | When an electrostatic charge is created in an object because it is placed near to a positively or negatively charged object. A negatively charged object will repel electrons from a nearby insulator, making the side of that insulator nearest to the charged object positive and the far side negative. The two objects will then be attracted. |
| **Electric current (I)** | The rate of flow of electric charge. The unit of current is the ampere, or amp (A) for short. One amp is one coulomb of charge flowing every second |
| Electric field | The area around a charged object where the electrostatic force can be felt. |
| Electrostatic force | A non-contact force that acts between particles or objects that have electrical charges. If the charges are the same, the objects or particles will repel. If the charges are opposite, the objects or particles will be attracted. |
| Kilowatt-hour (kWh) | A unit of energy consumption in domestic electricity. The kilowatt-hour is abbreviated to kWh. It is also called a 'unit' when paying for your electricity bill. One kilowatt-hour is the amount of electrical energy that is transferred when an appliance that is rated at 1 kW is used constantly for 1 hour. This is a lot of electrical energy – equivalent to 3 600 000 joules! |
| Non-contact force | A force between two objects that can affect them even when they are not touching. |
| Potential difference (p.d.) | Also called the voltage, this is the energy that a cell or battery gives to the charge that it pushes round a circuit. The p.d. is measured in volts, V. One volt is equivalent to one joule of energy per coulomb of charge. |
| Static electricity | A difference in electrical charge between two objects (or two parts of an object) that remain stationary. As the potential difference (p.d.) between the two objects increases, the static electricity may be discharged as a spark. |

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## Intent – Concepts

| Lesson title | Learning challenge | Higher level challenge | Suggested activities and resources |
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| B8.7 L1 The breathing system | Can I describe the structure of the breathing system?<br>Can I describe the symptoms of asthma? | Can I explain how the breathing system is adapted? | |
| B8.7 L2 Gas Exchange | Can I describe how gases diffuse to and from our blood in our lungs? | Can I describe how gas exchange occurs in other organisms? | |
| B8.7 L3 Breathing | Can I describe how we breathe? | Can I explain how the lungs are adapted for their function | |
| B8.7 L4 The heart | Can I describe the structure of the heart and | Can I describe the four components | |

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| | how it works? | that make up our blood? | |
| C8.7 L1 A guided tour | Can I identify the groups and periods on the Periodic Table?<br>Can I describe that elements in the same group have similar properties? | Can I explain, in terms of electron configuration, the reason for similar properties. | |
| C8.7 L2 Spotting Patterns | Can I describe how the electron structure of an atom is linked to its chemical properties and its place on the Periodic Table? | Can I describe how some metals react with cold water and link this to their electron configuration? | |
| C8.7 L3 Developing the periodic table | Can I describe how ideas about classifying elements changed over time?<br>Can I describe the main contributions made by Döbereiner, Newlands and Mendeleev? | Can I explain how Mendeleev was able to make predictions about undiscovered elements. | |
| C8.7 L4 Predicting Patterns | Can I describe the properties of the elements in group 7? | Can I make predictions about an unknown element from its position in the periodic table? | |

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| P8.7 L1 Static Electricity | Can I state that opposite charges attract and negative charges repel?<br>Can I recall the equation that links charge, current and time? | Can I use the equation that links charge, current and time?<br>Can I describe how some objects can be charged by friction?<br>Can I describe how lightning is generated in a storm cloud? | |
| P8.7 L2 Domestic Electricity and Power | Can I recall the equation that links power, current and voltage? | Can I use and rearrange the equation that links power, current and voltage?<br>Can I use and rearrange the equation that links power, energy and time? | |
| P8.7 L3 Paying for Electricity | Can I recall the equation that links energy, power and time?<br>Can I calculate the cost of domestic electricity? | Can I use and rearrange the equation for energy, power and time? | |