



**Science Scheme of Learning**

**Year 7 – Term 6/Units 6**

**Intent – Rationale**

. Students consider what a healthy diet consists of and how foods are tested for their content. The anatomy of the digestive system is learnt along with the functions of its parts.

The difference between compounds and elements is considered along with the conventions for using formulae and symbols. Students then apply this to telling apart mixtures and compounds. Conservation of mass is also introduced.

The effects of force on speed is investigated, students progress to calculating speed and interpreting speed graphs. They consider the difference between mass and weight and the effect of gravity on falling objects. Students progress to consider streamlining and air resistance.

| Sequencing – what prior learning does this topic build upon?  | Sequencing – what subsequent learning does this topic feed into?   |
|---|--|
| <p><b>Topic B7.1 Cells and Tissues</b><br/> <b>Topic C7.1 Particles</b><br/> <b>Topic C7.2 Atoms and elements</b><br/> <b>Topic C7.4 Pure and impure substances</b><br/> <b>Topic C7.5 Simple chemical reactions</b><br/> <b>Topic P7.1 Energy transfers</b><br/> <b>Topic P7.2 Forces and effects</b></p>  | <ul style="list-style-type: none"> <li>• Topic B8.8 Respiration, C8.7 Periodic table, C8.10 Describing reactions and C8.11 Earth and atmosphere. Topic P8.10 Application of forces and P8.12 Exploring Space.</li> <li>• GCSE Units B1 Cell structure and transport, B3 Organisation and the digestive system, B9 respiration.</li> <li>• GCSE Topic 1 Atomic Structure and the Periodic Table, Topic 2 Bonding, Topic 4 Chemical Changes</li> <li>• GCSE Physics Units P8 Forces in balance, P9 Motion, P10 Forces in motion</li> </ul> |
| What are the links with other subjects in the curriculum?   | What are the links to SMSC, British Values and Careers?  |
| <ul style="list-style-type: none"> <li>• Base the content here on what you already know but there will be time in future to liaise further as part of our collaborative work</li> </ul>   | <ul style="list-style-type: none"> <li>• B7.6 L4 GB4agi</li> </ul>   |
| What are the opportunities for developing literacy skills and developing learner confidence and enjoyment in reading?   | What are the opportunities for developing mathematical skills?   |
| <p>FROM THE LIBRARY<br/> <i>How Does my Diet Affect Me?</i> Patsy Wesycott-613<br/> <i>Nutrition and Diet Lisa Firth-</i> 613.2 ( Issues)<br/> <i>Digestive System;</i> Carol Ballard-612.3<br/> <i>Disgusting Digestion;</i> Nick Arnold-612<br/> <i>Digesting;</i> Angela Royston-612.3<br/> <i>Air and Water Chemistry;</i> Brian knapp-541<br/> <i>Horrible Science: Chemical chaos;</i> Nick Arnold-500<br/> <i>Fatal Forces;</i> Nick Arnold-500<br/> <i>Force and Motion:</i> P. Lafferty-531<br/> <i>Forces and Movement;</i> Peter Riley-531</p> | <ul style="list-style-type: none"> <li>• Mean</li> <li>• Energy released per gram</li> </ul>   |



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**Science Scheme of Learning**

**Year 7 – Term 6/Units 6**

**Intent – Concepts**

| What knowledge will students gain and what skills will they develop as a consequence of this topic?   |  |
|---|--|
| <b><u>Know</u></b>  |  |
| <ul style="list-style-type: none"> <li>▪ State the names of the 7 food groups. Safely test foods for the presence of food groups. State that different foods contain different amounts of energy and that this can be measured indirectly. Name some organs of the human digestive system.</li> <li>▪ State the meaning of the term compound and give some examples. Recognise some elements and compounds from their symbols and formulae. Describe the difference between a mixture and a compound. State that mass is conserved in a reaction.</li> <li>▪ Identify balanced and unbalanced forces. Explain how speed, distance and time are related to each other. Produce a simple distance time graph. Explain the differences between mass and weight.</li> </ul>   |  |
| <b><u>Apply</u></b>   |  |
| <ul style="list-style-type: none"> <li>▪ Give examples of foods containing these. Record results in a suitable way. Explain that experiments should be repeated and means calculated in order to increase reliability. Describe the role of each digestive system organ.</li> <li>▪ State the meaning of the term molecule. Represent elements and compounds using particle diagrams and formulae. Draw particle diagrams. Give some examples of reactions in which the mass seems to go up or down.</li> <li>▪ Carry out an investigation to find out what is meant by 'constant speed'. Carry out an experiment to find the effect of changing the height of a slope on the time it takes a ball to cover a set distance. Decide on a suitable scale for the axis for a graph. Carry out a fair test to investigate the effect that area has on the motion of a various sizes of cake case.</li> </ul>  |  |
| <b><u>Extend</u></b>  |  |
| <ul style="list-style-type: none"> <li>• Discuss the need for a balanced diet. Recall that tests can be performed to identify different food groups in samples. Design an experiment using appropriate control variables to ensure a fair test. Explain what happens as food passes through the digestive system.</li> <li>• Describe that the properties of a compound are different from the properties of the elements it is made from. Name some compounds from their formulae. Give some examples of mixtures and some examples of compounds. Explain why examples still obey the law of conservation of mass.</li> </ul> <ul style="list-style-type: none"> <li>▪ Describe how forces can alter the speed or direction of an object. Explain how speed, distance and time are related to each other and use the formula to calculate various speeds. Calculate speed from a distance time graph. Explain how drag/air resistance opposes motion like friction.</li> </ul> |  |
| What subject specific language will be used and developed in this topic?  | What opportunities are available for assessing the progress of students? |



- B7.6 L3 making and recording observations.
- Show you can challenge: C7.6 L1, C7.6 L2, C7.6 L3, P7.6 L1.
- Presenting and interpreting data C7.6 L4.
- Evaluation P7.6 L4

| Word                       | Definition   |
|----------------------------|--|
| <b>Absorption</b>          | The process by which a substance moves from one place into another substance or place (usually by diffusion or osmosis).   |
| <b>Anaemia</b>             | A condition that occurs when there are not enough red blood cells in someone's blood. This can be caused by a lack of iron in the diet, because iron is an essential part of haemoglobin, which is the pigment in red blood cells that carries oxygen.   |
| <b>Balanced diet</b>       | A diet that contains appropriate amounts of all the food types. Eating a balanced diet helps us to stay healthy. A balanced diet will be different for different people, depending on their age, what job they do, how active they are and so on.  |
| <b>Benedict's solution</b> | A solution that is used to test for the presence of reducing sugars, including glucose, lactose and maltose. If a very small amount of a suitable sugar is present, the result is a colour change from blue to green. If more sugar is present, the blue solution changes to yellow, orange or red.          |
| <b>Biuret reagent</b>      | A chemical test that is used to detect the presence of protein in a sample of food. If protein is present, the solution turns from blue to purple.   |
| <b>Carbohydrate</b>        | A chemical that is made from carbon, hydrogen and oxygen. Carbohydrates are important in the diet because they act as a short-term energy store. In the diet, carbohydrates can either be simple, such as sugars, or complex, such as starch.  |
| <b>Catalyst</b>            | A substance that speeds up a chemical reaction without being used up or chemically changed. Catalysts are usually specific to one of a few chemical reactions. Biological catalysts that act in cells or organisms are made from proteins and are called enzymes.  |
| <b>Deficiency disease</b>  | A disease caused by lack of a mineral or vitamin in the diet.  |
| <b>Digestion</b>           | The process of breaking food down into useful small molecules that can then be absorbed into cells. In humans, digestion begins in the mouth with chewing (an example of physical digestion) and then continues with chemical digestion in the stomach and intestines, as a result of the action of enzymes. |
| <b>Digestive system</b>    | The set of organs in the body that is responsible for digestion. These include the stomach, intestines and liver.  |
| <b>Enzyme</b>              | A complex molecule found in cells of an organism that speeds up biochemical reactions.   |
| <b>Fat</b>                 | A group of chemical compounds made from carbon, hydrogen and oxygen that are made by animals and plants as a way to store energy.  |
| <b>Fibre</b>               | When used to describe part of the diet, fibre refers to plant material (cellulose) that cannot be digested by humans. It is essential in order to keep the intestines healthy, providing them with solid material that the muscular walls can push along.  |
| <b>Gut flora</b>           | A general term for bacteria that live inside the digestive system.   |
| <b>Iodine solution</b>     | A dark brown solution that can be used to test for the presence of starch. If starch is present, the positive result is a blue-black colour.   |
| <b>Large intestine</b>     | The part of the digestive system that absorbs water and forms faeces from undigested food. It is also known as the colon.  |



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| <b>Mineral</b>         | When used to describe something in the diet, 'mineral' refers to a chemical element that is needed in small quantities in the diet in order for someone to stay healthy.   |
| <b>Obese</b>           | When a person is very overweight. Obesity can cause significant health problems, including increased wear and tear on joints, increased risk of diabetes and increased risk of heart disease.  |
| <b>Oesophagus</b>      | Also known as the 'gullet', this is the tube from the throat to the stomach. Muscles in the wall of the oesophagus contract to push food down into the stomach. This process is known as peristalsis.  |
| <b>Pancreas</b>        | An organ in the digestive system that secretes enzymes for digestion, as well as secreting the hormones insulin and glucagon, which regulate the amount of sugar circulating in the blood and the amount of carbohydrate stored in the liver.                          |
| <b>Protein</b>         | A long molecule made up from many amino acids joined together. In the diet, proteins are needed to repair tissues and for the growth of new cells.   |
| <b>Respiration</b>     | The chemical reactions that allow living things to release energy from compounds such as glucose.<br>In general, aerobic respiration can be summarised with the following word equation:<br>glucose + oxygen → carbon dioxide + water                                  |
| <b>Rickets</b>         | A disease caused by a shortage of vitamin D in the body, usually because there is insufficient vitamin D in the diet. This leads to a softening of the bones, mainly in children. A common symptom is deformed, bowed legs.  |
| <b>Salivary glands</b> | Glands in the mouth that produce saliva. Saliva is mainly water with some mucus, antibacterial agents and digestive enzymes (mainly amylase).  |
| <b>Scurvy</b>          | A disease caused by a lack of vitamin C in the diet. Scurvy can lead to spongy gums and tooth loss. Scurvy was a problem on board ocean ships many years ago, when fresh fruit and vegetables were not available.  |
| <b>Small intestine</b> | The part of the digestive system in which the breakdown of complex molecules into smaller molecules is completed and the nutrients are absorbed into the blood. In humans it is around 7 m long, compared with the large intestine, which is approximately 1.5 m long. |
| <b>Stomach</b>         | A muscular organ in the digestive system in which food is digested by physical and chemical digestion.   |
| <b>Villi</b>           | Finger-like projections lining the small intestine that increase the surface area for the absorption of nutrient molecules from digestion.   |
| <b>Vitamin</b>         | An organic (carbon-based) compound that is needed by an organism in small amounts in its diet because it cannot be made by the organism in sufficiently large quantities for healthy life.   |



| Word                         | Definition  |
|------------------------------|---|
| <b>Atom</b>                  | 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). All atoms are electrically neutral because they have the same number of protons and electrons. Atoms can be split apart into protons, neutrons and electrons but they cannot then be considered a particular element. |
| <b>Compound</b>              | A pure substance made from more than one element in which the atoms combine in a fixed ratio. For example, the two elements hydrogen and oxygen can react together to produce the compound water.<br><i>Examples of compounds include water, carbon dioxide, methane and sodium chloride.</i>   |
| <b>Electrolysis</b>          | Splitting up a pure liquid or dissolved compound using electricity. The liquid is called the electrolyte and there are two electrodes dipped into it. These electrodes are connected to a DC power supply and elements form at each electrode when the current flows.<br><i>Electrolysis is used for the extraction of aluminium and the purification of copper.</i>  |
| <b>Element</b>               | A pure substance made from only one type of atom. There are approximately 100 elements and they are listed in the Periodic Table.   |
| <b>Mixture</b>               | A substance that is made from more than one element or compound that are not chemically bonded to each other. The components of a mixture are not present in a fixed ratio and can often be separated relatively easily using physical processes such as filtration and distillation.<br><i>Seawater is a mixture, and so is air.</i>   |
| <b>Molecule</b>              | A cluster of atoms that are joined by covalent bonds. Molecules can therefore only be made from non-metal atoms.  |
| <b>Relative atomic mass</b>  | The mass of an atom in terms of the total number of protons and neutrons in its nucleus. The relative atomic mass is given on the Periodic Table.<br><i>For example, carbon has 6 protons and 6 neutrons. So its relative atomic mass (RAM) is <math>6 + 6 = 12</math>.</i>   |
| <b>Relative formula mass</b> | The sum of relative atomic masses in a compound, or in an element where more than one atom of the element is bonded together in a molecule.<br><i>The relative formula mass (RFM) of water (H<sub>2</sub>O) is <math>1+1+16 = 18</math>.<br/>The RFM of an oxygen molecule (O<sub>2</sub>) is <math>16+16 = 32</math>.</i>  |
| <b>Thermal decomposition</b> | A type of chemical reaction in which a compound splits up when it is heated. These reactions absorb a lot of energy and usually take place at very high temperatures.   |



An example of a common thermal decomposition reaction is heating baking soda (sodium hydrogencarbonate), which causes it to break down into three other compounds: sodium carbonate, water and carbon dioxide.

| <b>Word</b>                  | <b>Definition</b>  |
|------------------------------|--|
| Accelerate                   | When something increases its velocity (or speed). Acceleration can also be used to describe when something slows down, but in this case it will have a negative value.   |
| Air resistance or drag       | A force that acts on a moving object as it passes through air, acting in the opposite direction to the direction of travel and thus having the effect of slowing the object down or preventing it from accelerating.   |
| Decelerate                   | To slow down. Deceleration can also be expressed as 'negative acceleration'.   |
| Force                        | An action that can stretch or compress an object, or cause it to speed up, slow down or change its direction of motion.  |
| Gradient                     | On a graph, the gradient is the steepness of the line. This is calculated by dividing the increase in the y-value by the increase in the x-value. A line with a positive gradient extends upwards to the right. A straight line has a constant gradient.<br>The gradient of a line graph can tell us useful information. For example, the gradient of a distance-time graph is the speed; the gradient of a velocity-time graph is the acceleration. |
| Gravitational field strength | This is a measurement of the effect of gravity on a given mass on a particular planet. On Earth, gravity exerts a force that is approximately 10 newtons on each kilogram of mass.   |
| Mass                         | The amount of matter in an object, measured in kilograms. Mass is the same anywhere in the universe - unlike weight (measured in newtons), which depends on the mass and the gravitational field strength.   |
| Speed                        | A measurement of how fast something is going. Speed is calculated by dividing the distance travelled by the time taken to travel that distance. Common units for speed include metres per second (m/s) and kilometres per hour (km/h).   |
| Weight                       | The force of gravity on an object. Weight always acts towards the centre of a planet. Its size depends on the mass and the gravitational field strength.   |



Intent – Concepts

| Lesson title                        | Learning challenge   | Higher level challenge  | Suggested activities and resources |
|-------------------------------------|--|---|------------------------------------|
| <b>B7.6 L1 Food groups</b>          | Can I state the names of the 7 food groups?  | Can I discuss the need for a balanced diet?   |                                    |
| <b>B7.6 L2 Food tests</b>           | Can I safely test foods for the presence of food groups?   | Can I recall that tests can be performed to identify different food groups in samples?                              |                                    |
| <b>B7.6 L3 Energy in food</b>       | Can I state that different foods contain different amounts of energy and that this can be measured indirectly? | Can I design an experiment using appropriate control variables to ensure a fair test?                               |                                    |
| <b>B7.6 L4 The Digestive system</b> | Can I name some organs of the human digestive system?  | Can I explain what happens as food passes through the digestive system?   |                                    |
| <b>C7.6 L1 Combining Elements</b>   | Can I state the meaning of the term compound and give some examples?   | Can I describe that the properties of a compound are different from the properties of the elements it is made from? |                                    |
| <b>C7.6 L2 The chemists code</b>    | Can I recognise some elements and compounds from their   | Can I name some compounds from their formulae?  |                                    |



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|--|---|---|--|
|  | symbols and formulae?   |   |  |
| <b>C7.6 L3<br/>Mixtures and compounds</b>    | Can I describe the difference between a mixture and a compound?       | Can I give some examples of mixtures and some examples of compounds?  |  |
| <b>C7.6 L4<br/>Conservation of matter</b>    | Can I state that mass is conserved in a reaction?                     | Can I explain why these examples still obey the law of conservation of mass?                                    |  |
| <b>P7.6 L1<br/>Effects of force on speed</b> | Can I identify balanced and unbalanced forces?                        | Can I describe how forces can alter the speed or direction of an object?  |  |
| <b>P7.6 L2<br/>Studying motion</b>           | Can I explain how speed, distance and time are related to each other? | Explain how speed, distance and time are related to each other and use the formula to calculate various speeds? |  |
| <b>P7.6 L3<br/>Motion graphs</b>             | Can I produce a simple distance time graph?                           | Can I calculate speed from a distance time graph?   |  |
| <b>P7.6 L4<br/>Falling</b>                   | Can I explain the differences between mass and weight?                | Can I explain how drag/air resistance opposes motion like friction?   |  |
| Topic 6 test                                 | Summative assessment  |   |  |
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