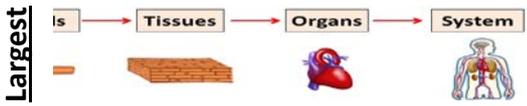
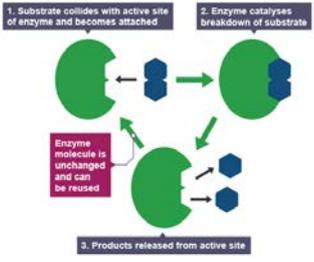
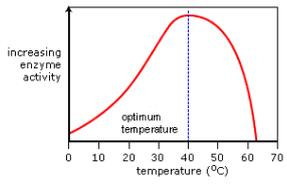


## 4.2 Organisation – Knowledge organiser

### Topic 1 – Principles of Organisation

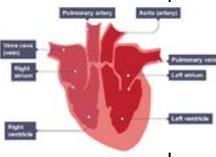
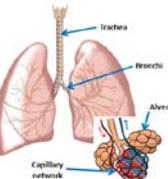
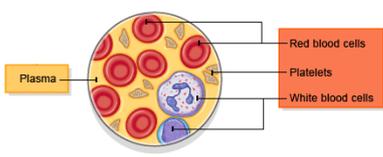
1	<b>Cells</b>	Cells are the basic building blocks of all living organisms.
2	<b>Tissues</b>	A <b>Tissue</b> is a <b>group of cells</b> with a similar structure and function.
3	<b>Organs</b>	<b>Organs</b> are made up of a number of <b>tissues</b> , which work together to perform a specific function. Example- the <b>heart</b> .
4	<b>Organ System</b>	An <b>organ system</b> is a group of <b>organs</b> which work together to form organisms. Example- the <b>digestive system</b> .
5	<b>Organisation</b>	

### Topic 2 – Animal tissues, Organs and Organ Systems

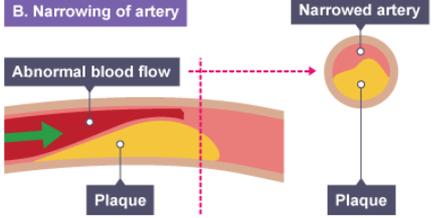
1	<b>The Digestive system</b>	<p>Is an <b>organ system</b> in which several <b>organs</b> work together to <b>digest</b> and <b>absorb food</b>.</p> <p>The <b>digestive system</b> is made up of the following parts:</p> <ul style="list-style-type: none"> <li>– <b>Glands</b>- pancreas and salivary glands- produce digestive juices</li> <li>– <b>Stomach &amp; small intestine</b>- where digestion occurs</li> <li>– <b>Liver</b>- produces <b>bile</b></li> <li>– <b>Small Intestine</b>- where digested food nutrients are absorbed</li> <li>– <b>Large Intestine</b>- where water is absorbed from any undigested food, producing faeces.</li> </ul>
	<b>Bile</b>	<b>Bile</b> is made in the <b>liver</b> and stored in the <b>gall bladder</b> . It is <b>alkaline</b> to <b>neutralise hydrochloric acid</b> from the stomach. It also <b>emulsifies fat</b> to form small droplets which <b>increases the surface area</b> . The alkaline conditions and large surface area <b>increase the rate</b> of fat breakdown by lipase.
2	<b>Enzymes</b> 	<p><b>Enzymes</b> are <b>biological catalysts</b> (speed up chemical reactions in organisms). <b>Metabolism</b> is the sum of all the chemical reactions in the body.</p> <p><b>Lock and key model</b></p> <p><b>Enzymes</b> are folded into complex shapes that allow smaller molecules to fit into them. The place where these molecules fit is called the <b>active site</b>. The shape of the <b>active site</b> matches the shape of its substrate molecules. This makes enzymes highly <b>specific</b> – each type of enzyme will only work with one type of reaction.</p> <p><b>Enzymes</b> are used in digestion to convert food into <b>small soluble molecules</b> which can be absorbed into the bloodstream.</p>
	 <p><b>Enzyme Activity</b></p>	<p><b>Temperature</b></p> <p><b>High temperatures</b> change the shape of enzymes. If the temperature gets too high the enzyme will be <b>denatured</b>.</p> <p><b>pH</b></p> <p>Different enzymes work best at different <b>pH</b> values. This is called the <b>optimum pH</b></p>
3	<b>Carbohydrase</b>  <b>Amylase</b> <b>Starch → sugars</b>	<p><b>Carbohydrase</b> breaks down carbohydrates into simple sugars. <b>Amylase</b> is an example of a <b>carbohydrase</b>.</p> <p>The <b>enzyme amylase</b> is produced in the <b>salivary gland, pancreas</b> and <b>small intestine</b>. It catalyses the breakdown of <b>starch</b> into <b>sugars</b> in the <b>mouth</b> and <b>small intestine</b>.</p>

4	<b>Protease</b> <b>Protein → amino acids</b>	<b>Protease</b> enzymes are produced in the <b>stomach</b> , pancreas and <b>small intestine</b> . It catalyses the breakdown of <b>proteins</b> into <b>amino acids</b> .		
5	<b>Lipase</b> <b>Lipids → Fatty acids + glycerol</b>	<b>Lipase</b> enzymes are produced in the <b>pancreas</b> and <b>small intestine</b> . It catalyses the breakdown of <b>lipids (fats)</b> into <b>fatty acids</b> and <b>glycerol</b> in the <b>small intestine</b> .		
	<b>Products of digestion</b>	The products of digestion are used to <b>build new carbohydrates, lipids and proteins</b> . Some glucose is used in <b>respiration</b> .		
	<b>Food tests</b>	<b>Benedict's Solution</b> Tests for <b>sugars (glucose)</b> Positive result green, <b>orange</b> , red	<b>Iodine Solution</b> Tests for <b>starch</b> Positive result <b>blue/black</b> colour	<b>Biuret Solution</b> Tests for <b>protein</b> Positive result <b>violet</b>

## Topic 3 – The Heart & Blood Vessels

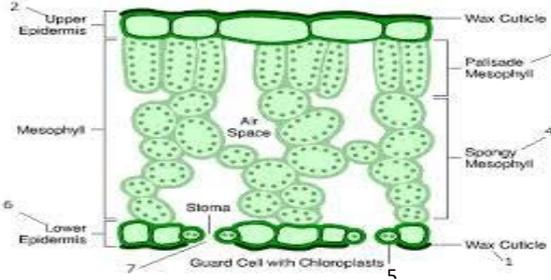
1	<b>Heart</b> 	The <b>heart</b> is an <b>organ</b> that pumps blood around the body in a <b>double circulatory system</b> . The <b>right ventricle</b> pumps blood to the <b>lungs</b> where gas exchange takes place. The <b>left ventricle</b> pumps blood around the <b>whole body</b> .		
	<b>Heart Rate</b>	The natural resting <b>heart rate</b> is controlled by a <b>group of cells</b> located in the <b>right atrium</b> that act as a <b>pacemaker</b> . Artificial pacemakers are electrical devices used to correct irregularities in the heart rate.		
2	<b>Blood Vessels</b>	<p><b>Arteries:</b> Carry blood away from the heart (except pulmonary artery), Have <b>thick muscular walls</b>, Contain blood under high pressure</p> <p><b>Veins:</b> Carry blood to the heart (except pulmonary vein), Have <b>thin walls</b>, Contain blood under low pressure, Have <b>valves</b> to <b>prevent the blood flowing backwards</b></p> <p><b>Capillaries:</b> 1 cell thick for effective diffusion, connect arteries to veins</p>		
3	<b>Lungs</b> 	<p><b>Alveoli-</b> have a <b>large surface area</b> and are <b>one cell thick</b> to allow fast gas exchange.</p> <p>The <b>alveoli</b> are surrounded by a network of <b>capillaries</b>.</p>		
	<b>Blood</b>	<p>Blood is a <b>tissue</b> which is made up of <b>plasma</b>, <b>red blood cells</b>, <b>white blood cells</b> and <b>platelets</b>.</p> <p><b>Red blood cells</b></p> <ul style="list-style-type: none"> <li>• <b>Flattened disc shape</b>- large surface area for gas exchange.</li> <li>• <b>Contains haemoglobin</b>- to absorb oxygen</li> <li>• <b>No nucleus</b>- so the cell can hold more haemoglobin.</li> </ul> <p><b>White blood cells</b> Help to protect the body against infection</p> <p><b>Platelets</b> Help the blood to clot, forming a scab.</p> <p><b>Plasma</b> Contains dissolved substances and transports them around the body e.g. glucose and carbon dioxide.</p> 		

## Topic 4 – Health Issues

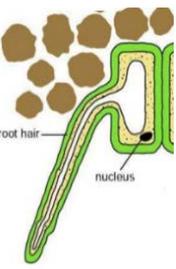
1	<b>Coronary Heart Disease</b>		<p>The coronary arteries supply blood to the heart muscle.</p> <p><b>Coronary heart disease</b>- layers of fatty material build up inside the coronary arteries, narrowing them. This reduces the blood flow, reducing the amount of oxygen reaching the heart muscle.</p>
2	<b>Treatments</b>	<p><b>Stents</b> are used to keep the coronary arteries open. <b>Statins</b> are widely used to reduce blood cholesterol levels, which slows down the rate of fatty material deposit.</p>	
3	<b>Faulty Heart Valves</b>	<p>Faulty heart valves don't open fully which can develop a leak. This can cause a backflow of blood which results in the heart having to work harder. Faulty valves can be replaced using biological valves (transplant) or mechanical valves.</p>	
4	<b>Heart Failure</b>	<p>Artificial hearts are occasionally used to keep patients alive whilst waiting for a heart transplant, or to allow the heart to rest as an aid to recovery.</p>	
5	<b>Health</b>	<p><b>Health</b> is the state of physical and mental well-being.</p> <p><b>Diseases</b> are major causes of ill health. Other factors also have an impact on health such as stress, diet and life situations.</p>	
6	<b>Diseases</b>	<p><b>Communicable diseases</b>- caused by <b>pathogens</b>, they can be transmitted.</p> <p><b>Non-communicable diseases</b>- not infectious diseases cannot be transmitted. Non-communicable diseases are affected by lifestyle factors such as diet, exercise, alcohol and smoking.</p> <p><b>Risk factors</b> for some non-communicable diseases:</p> <ul style="list-style-type: none"> <li>• Diet, smoking and exercise- <b>cardiovascular disease</b></li> <li>• Obesity – <b>type 2 diabetes</b></li> <li>• Smoking- <b>lung disease and lung cancer</b></li> <li>• Smoking and alcohol- <b>development of unborn babies</b></li> <li>• Carcinogens (e.g. ionising radiation)- <b>cancer</b></li> </ul> <p>Many diseases are caused by the <b>interaction of a number of risk factors</b>.</p>	
7	<b>Cancer</b>	<p><b>Cancer</b> is uncontrolled cell division.</p> <p><b>Benign tumour</b>- growth of abnormal cells which are contained in one area. They do not invade other parts of the body.</p> <p><b>Malignant tumour</b>- cancer cells that invade neighbouring tissues. They spread to different parts of the body through the blood stream causing secondary tumours.</p> <p>Cancers are caused by lifestyle risk factors and genetic risk factors.</p>	

# Topic 5 – Plant Tissues, Organs and Systems

1	<b>Plant Organs &amp; Tissues</b>	<p>Plant <b>organs</b> include the stem, roots and leaves.</p> <p>Plant <b>Tissues</b> include:</p> <ul style="list-style-type: none"> <li>– <b>Epidermal tissue</b>- which covers the plant</li> <li>– <b>Mesophyll</b>- carries out <b>photosynthesis</b></li> <li>– <b>Xylem</b>- transports <b>water &amp; minerals</b> up the stem from the roots to the leaves</li> <li>– <b>Phloem</b>- transports <b>glucose</b> from the leaves <b>up and down</b> the stem to the rest of the plant</li> <li>– <b>Meristem</b>- found at the growing tips of the shoots and roots (actively dividing cells)</li> </ul>
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2	<p><b>Structure of the leaf</b></p> 	<ol style="list-style-type: none"> <li>1. <b>Wax cuticle:</b> prevents water loss</li> <li>2 &amp; 6. <b>Epidermis (upper &amp; lower):</b> top and bottom layers of cells</li> <li>3. <b>Palisade cells:</b> packed with chloroplasts, where most photosynthesis happens (get most light as at the top of the leaf)</li> <li>4. <b>Spongy Mesophyll:</b> contains air spaces between the cells to allow carbon dioxide to reach the palisade cells (large surface area)</li> <li>5. <b>Guard cells:</b> open and close the stomata, which helps to prevent too much water loss</li> <li>7. <b>Stoma/stomata:</b> holes on the underside of the leaf that allow carbon dioxide to diffuse into the leaf, and water and oxygen to diffuse out of the leaf.</li> </ol>
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3	<b>Transpiration</b>	<p><b>Transpiration</b> is the movement of water in a plant (from the roots up to the leaves)</p> <p>The rate of <b>transpiration</b> is affected by the <b>temperature, humidity, air movement and light intensity.</b></p>
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<p><b>Root hair cells</b></p>  <p>Plants <b>absorb</b> water from the soil by <b>osmosis</b>. <b>Root hair cells</b> are adapted for this by having a <b>large surface area</b> to speed up osmosis. Root hair cells use <b>active transport</b> to take <b>minerals and ions</b> from the soil</p>	<p><b>Xylem</b></p>  <p><b>Xylem</b> tissue transports <b>water and mineral ions</b> from the roots to the stems and leaves. It is composed of <b>hollow tubes</b> strengthened by lignin adapted for the transport of water in the transpiration stream.</p>	<p><b>Phloem</b></p>  <p><b>Phloem</b> tissue transports <b>dissolved sugars</b> from the leaves to the rest of the plant for immediate use or storage. The movement of food molecules through <b>phloem</b> tissue is called <b>translocation</b>. Phloem is composed of <b>tubes of elongated cells</b>. Cell sap can move from one phloem cell to the next through pores in the end walls.</p>
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