

Year Group:	4	Strand: 4	What do our bodies do with the food we eat?
Biology			
Key NC Reference and Objectives	<ul style="list-style-type: none"> Describe the simple functions of the basic parts of the digestive system in humans Identify the different types of teeth in humans and their simple functions 		
Enquiry Approaches and Skills in Science	<div style="display: flex; justify-content: space-between;"> <div style="width: 48%;"> <p>ENQUIRY APPROACHES</p> <ul style="list-style-type: none"> <li style="background-color: #003366; color: white; padding: 5px; margin-bottom: 5px;"> Comparative / fair testing Changing one variable to see its effect on another, whilst keeping all others the same. <li style="background-color: #92d050; color: white; padding: 5px; margin-bottom: 5px;"> Research Using secondary sources of information to answer scientific questions. <li style="background-color: #e67e22; color: white; padding: 5px; margin-bottom: 5px;"> Observation over time Observing changes that occur over a period of time ranging from minutes to months. <li style="background-color: #0099cc; color: white; padding: 5px; margin-bottom: 5px;"> Pattern-seeking Identifying patterns and looking for relationships in enquiries where variables are difficult to control. <li style="background-color: #e91e63; color: white; padding: 5px; margin-bottom: 5px;"> Identifying, grouping and classifying Making observations to name, sort and organise items. <li style="background-color: #4caf50; color: white; padding: 5px;"> Problem-solving Applying prior scientific knowledge to find answers to problems. </div> <div style="width: 48%;"> <p>ENQUIRY SKILLS</p> <ul style="list-style-type: none"> <li style="border: 1px solid #003366; padding: 5px; margin-bottom: 5px;"> Asking questions Asking questions that can be answered using a scientific enquiry. <li style="border: 1px solid #92d050; padding: 5px; margin-bottom: 5px;"> Making predictions Using prior knowledge to suggest what will happen in an enquiry. <li style="border: 1px solid #e67e22; padding: 5px; margin-bottom: 5px;"> Setting up tests Deciding on the method and equipment to use to carry out an enquiry. <li style="border: 1px solid #0099cc; padding: 5px; margin-bottom: 5px;"> Observing and measuring Using senses and measuring equipment to make observations about the enquiry. <li style="border: 1px solid #e91e63; padding: 5px; margin-bottom: 5px;"> Recording data Using tables, drawings and other means to note observations and measurements. <li style="border: 1px solid #4caf50; padding: 5px; margin-bottom: 5px;"> Interpreting and communicating results Using information from the data to say what you found out. <li style="border: 1px solid #e67e22; padding: 5px;"> Evaluating Reflecting on the success of the enquiry approach and identifying further questions for enquiry. </div> </div>		
Key Investigation	<ul style="list-style-type: none"> Investigate the effect that soft drinks can have on our teeth (through the use of egg shells) <p style="margin-left: 20px;">Enquiry Approach: Observing over time, comparative/fair testing</p> <p style="margin-left: 20px;">Enquiry Skills: Making predictions, observing, gathering and recording data to help in answering questions, interpreting and communicating results, evaluating.</p> <p style="margin-left: 20px;">Guidance: (See instruction below – from Reach Out CPD - on how to run experiment and what is needed) Children will test different soft drinks on eggshells to see the affect it can have. Often it is not only the sugar in drinks that damages our teeth, but the acid. Eggshells were used in the healthy teeth demonstration to represent teeth, as they are made of very similar material. Fruit juice and cola are both very acidic and can damage our teeth, whereas milk and water will not. Sugary foods and drinks are bad for our teeth, because bacteria living on the teeth will eat the sugar and produce acids as a waste product. It is this acid that causes tooth decay. Children could use magnifying glasses to compare eggs shells, drawing diagrams of each of them and recording the changes. Top Tip: Wash and clean the egg shells for use in the experiment. Break them into similar sized pieces.</p> 		
Other suggestions for investigations and activities	<ul style="list-style-type: none"> Investigate the different tooth types in humans. <p style="margin-left: 20px;">Enquiry Approach: Identifying, grouping and classifying</p> <p style="margin-left: 20px;">Enquiry Skills: Asking questions, recording data and interpreting and communicating results</p> <p style="margin-left: 20px;">Guidance: Children need to know that they have two sets of teeth as they grow up. The first set are called milk teeth and there are 20 of them. They begin to be replaced from the age of 6 to 8 year of age. Children need to understand there are four different teeth in humans and each has a slightly different function (See background knowledge below). Using a practical tasks you can show how the teeth work: Incisor teeth for cutting into food, e.g. use a knife to chop up celery Canines are for tearing up food, e.g. use a nail to tear up a slice of bread on a board Molars grind up food, e.g. place some larger sugar crystal in a mortar and grind them with a pestle. Children can look at their own teeth in a mirror to see if they can identify any of the types. Children label a diagram of teeth with the correct names or could draw a diagram of their own mouth and label with correct names. Extension for deeper learning: Explore the skulls of animals with teeth in and compare to humans. Can the children identify different teeth type in animals? Can they explain why some animals would have molars and some incisors depending on their diet? Misconceptions linked to this:</p> 		

Children may believe that food is digested in the stomach and do not recognise the part the teeth and saliva play in breaking down food.

To challenge this, you could model the action of the stomach with transparent food bags. In one place a little saliva (water), this has been 'chewed'. In the other, put a whole biscuit. Add stomach acid (lemon juice) to both bags and squeeze and crush both bags to represent the action of the stomach muscles. Which breaks the biscuit down first? Why? Why are our teeth and saliva an important part of the digestive system? We eat as we need the nutrients from our food – protein, carbohydrates, fat, vitamins, and minerals. We can only use nutrients that have been broken down and dissolved. Food is broken down into smaller pieces by chewing. The teeth cut and crush the food, while it's mixed with saliva. Saliva contains enzymes, which begin breaking down parts of the food. This process help to make it soft, easier to swallow and easier for the stomach to continue breaking down into smaller pieces.

- Investigate the key parts of the digestive system and how it works.

Enquiry Approach: Identifying, grouping and classifying, researching using secondary sources

Enquiry Skills: Asking questions, making predictions, recording data and interpreting and communicating results

Guidance:

Part One: Research

Main parts of the body associated with the digestive system are the mouth, tongue, teeth, oesophagus, stomach, small and large intestine and rectum. Each has a special part to play in breaking down and absorbing food so our body can use the nutrients.

Children explore and research the different parts of the digestive systems through secondary sources and videos. You could use the Augmented reality T-shirt (ready available in school) to show children inside of the body. Children put on the t-shirt and then you can use the app to show inside organs on the whiteboard.

Part Two: Demonstrating the digestive system

(See instruction below – from Reach Out CPD or Teaching Primary Science - on how to run experiment and what is needed)

Use a model in the classroom to demonstrate what happened to a piece of food as it travels through the body.

Possible Outcomes: Children could label a diagram of the different parts or write an account of what happens to a piece of food as it passes through the body. Children can record experiment through pictures and create a chronological report of the digestive system. Children could record different parts of the experiment on iPads and write a script to create a video for an informative clip of the digestive system.

Misconceptions linked to this:

Some children might believe that the whole digestive system consists of a single tube that travels from their mouth to their stomach, and no further. Or they might think that food goes down one tube, and drink goes down another, hence food "going down the wrong hole". Explain to the children that food and drink both go down the same tube (oesophagus), and that air travels to our lungs through a different tube (trachea, or wind pipe). Link this to the previous practical activity and explain that when we swallow food and drink it goes down into the stomach where it is churned up. Be sure to mention what each of the parts of the model represent and what is happening at each stage.

You could ask children to place hands either side of their throat as they eat and drink. What can they feel? Does it feel different when swallowing food and drink?

You could show children an X-ray of a human eating and drinking.

To check their initial understanding, you could give the children large sheets of paper and ask them to draw around each other to get an outline of the body. They could then draw the different parts that they think are involved in digesting our food. They could add to this throughout the course of a lesson, revisiting at the end to draw what they now know the digestive system looks like.

Extension activities for gaining a deeper understanding (if time):

- Investigate how much iron is in your breakfast cereal.

- **Enquiry Approach:** Identifying, grouping and classifying

Enquiry Skills: Asking questions, making predictions, recording data and interpreting and communicating results

Guidance:

(See instruction below – from Reach Out CPD - on how to run experiment and what is needed)

Many people are aware that some foods are fortified with iron, but what they often don't realise is that the iron is added in the form of iron filings, and that it is possible to get these iron filings back out of the food using a magnet.

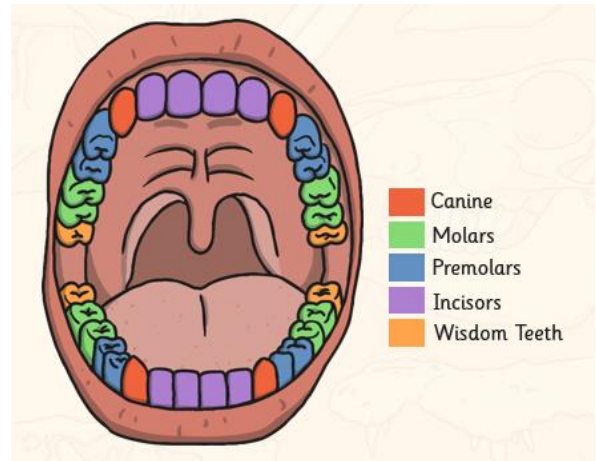
	<p>Misconceptions linked to this: Some children may believe that the only reason we eat food is to give us energy. Our bodies also need food in order to obtain a number of important vitamins and minerals. Vitamin D is essential for strong bones and vitamin C is important in protecting cells and keeping them healthy. Iron is an essential mineral that helps to make red blood cells, which carry oxygen around the body. If we have too little iron in our diet we can become anaemic.</p>	
Key scientists to learn about	N/A	
Previously Taught Vocabulary	<p>Organs Heart Lungs Reflex Senses Sweet Salty Sour Bitter Umami</p>	
New Key Vocabulary	<p>Anus: a muscular valve at the end of the digestive system through which undigested food is passed. Canines: pointed teeth next to the incisors, used for tearing food. Digestion: the breaking down of food into very small pieces (molecules) which can be absorbed into the blood and then carried around the body to the parts that need it. Digestive System: the group of organs that work together to break down and process food into components that can be utilised by the body. Enzyme: a chemical substance that helps reactions to occur in the body. Faeces: the solid waste material that is passed out of the body when we go to the toilet. Incisors: front teeth used for cutting food. Large Intestine: also called the colon, which removes water from the undigested food. Molars: teeth right at the back of the jaw used for crushing and grinding food.</p>	<p>Oesophagus: also called the gullet is the tube from the mouth to the stomach. Premolars: teeth next to the canines which grind food. Rectum: a chamber at the end of the small intestine in which undigested food is stored. Small intestine: the part of the intestine where digestion is completed. Saliva: a fluid produced in the mouth that contains enzymes that help digest food. Stomach: a muscular bag which churns food and begins protein digestion. It also contains acid to kill germs on food. Tongue: the muscle organ which helps swallow food but also has taste sensors for salt, sweetness, sourness, bitterness and for detecting the savoury taste called 'umami'.</p>
Teacher Background Knowledge	<p>Here's an overview of digestion using secondary level language. This can be a helpful reminder of the key concepts of digestion for you, the teacher.</p> <p>What Is Food? Food is the general term for any substance that is metabolised by a living thing to obtain energy and maintain life. Without energy, an organism's body systems would not function, and growth would not be possible. Plants create their own food through photosynthesis. This is the process by which sunlight, carbon dioxide and water are chemically reacted to form oxygen and carbohydrates. Animals, including humans, cannot create their own food, so must consume plants and/or other animals to obtain energy and nutrients (a general term for any substance that an organism requires, from vitamins to proteins). A balanced diet is one that contains the right nutrients in the right quantities, and should include carbohydrates, proteins, fats, minerals and vitamins. Once consumed, food enters the digestive system. Digestion is the process of breaking down food into particles small enough and simple enough to be absorbed into the bloodstream. The human digestive system is a complex body system involving multiple processes and parts of the body.</p> <p>Teeth:</p>	

Teeth are found in our mouths – we use them to help us eat. Humans have up to **32 adult teeth**, made up of four different types. Each type of tooth is designed for a specific job in the eating process – some cut, while other tear and grind our food.

Humans get two sets of teeth in their lifetime, so we need to look after them well and make sure that they don't rot. **Cleaning** teeth, eating the right **foods**, and regular visits to the **dentist** help to keep our teeth and gums healthy.

Types of teeth:

1. Incisors - Incisors help you bite off and chew pieces of food.
2. Canines - These teeth are used for tearing and ripping food.
3. Pre Molars - Holding and crushing food
4. Molars - These help you crush and grind food



Digestive System:

Digestion is a complex process that includes a number of components. Although young students do not require an in-depth knowledge of digestion, they should be familiar with the major organs involved, and the order in which digestion takes place.

The following information will provide useful background knowledge that will take you above and beyond your class's level of understanding.

Food enters the body through the mouth, where it is chewed by the teeth and mixed with a watery fluid called **saliva**. Saliva contains enzymes such as amylase and lipase, which begin to break down starch and fat respectively. Saliva also acts as a lubricant, making the food wet and soft enough to swallow easily. This lump of chewed food is called a bolus.

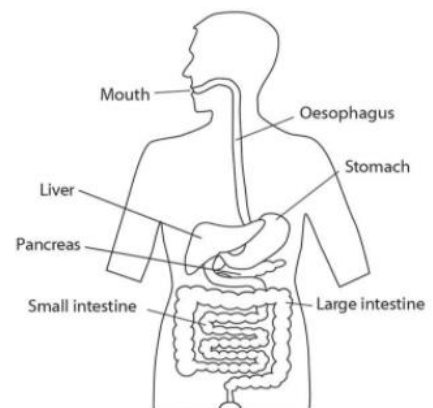
When it is ready to be swallowed, the food moves to the back of the throat where muscle contractions push it into the **oesophagus**. The oesophagus is a long tube that connects the pharynx to the **stomach**. As the muscular walls of the oesophagus contract and relax, the food is pushed downwards.

The stomach stores the ingested food and uses gastric juices to continue the digestive process. The walls of the stomach are wrinkled and folded, allowing it to expand as it fills. When full, an adult's stomach has a capacity of approximately 1.5 litres. The stomach is lined with mucus to protect it from the strong digestive acids.

Food can stay in the stomach for up to several hours before being pushed into the small intestine. **Enzymes** are secreted into the **small intestine** by the intestine walls and slowly the food is broken down. The products of digestion can then be absorbed through the lining of the small intestine into the bloodstream, and transported around the circulatory system to all the body's tissues.

Food that cannot be digested easily passes into the **large intestine**. Here, bacteria feed off it, creating useful substances like vitamin K (important for blood clotting, amongst other things). The walls of the large intestine absorb these vitamins as well as much of the water. Anything that can't be absorbed, such as fibre and dead bacteria, is eventually passed out of the body as **faeces**. This process is called egestion or defecation.

Be careful with the diagram you choose for KO/books as lots have American spellings on from Google.



Prior Knowledge

Children have covered the human's body in every year group. In Y1, children learnt the names of body parts and the use of senses and reflexes. In Y2, children explored the importance for humans of exercise, eating the right amounts of different types of food, and hygiene. In Y3, children explore how humans need the right types and amount of nutrition, and that they cannot make their own food; they get nutrition from what they eat. They also learnt how humans and some other animals have skeletons and muscles for support, protection and movement.

<p>Assessment</p>	<p>Thorough assessment of outcomes in books and folders, quizzes and written scientific investigations, also supported by observations and questioning in lessons, assessing the following:</p> <p>Knowledge:</p> <ul style="list-style-type: none"> - The digestive system in humans is comprised of several parts and each has a special function. Children can name and explain some of the parts. - Children understand that humans have different types of teeth and the function that they have. - Children understand that teeth can be damaged and need to be cared for. <p>Skills:</p> <ul style="list-style-type: none"> - Pupils have made predictions linked to the digestive system. - Pupils have asked questions linked to teeth and the digestive system based on their scientific knowledge. - Pupils have researched the digestive system using secondary sources as evidence to ask and answer questions. - Pupils have investigated the concept of a fair test and comparative test linked to teeth. - Pupils have made observations and recorded results in diagrams, drawings and charts. - Pupils have interpreted results and drawn simple conclusions from these. - Pupils have evaluated investigations, suggesting changes that could be made and generated questions about what to investigate next or further.
<p>Useful Planning Resources and Useful Links</p>	<p>Five videos linked to digestion: https://www.bbc.co.uk/bitesize/topics/z27kng8 https://www.natgeokids.com/uk/discover/science/general-science/your-digestive-system/ https://www.dkfindout.com/uk/human-body/digestion/</p> <p>Selection of videos: https://www.stem.org.uk/resources/elibrary/resource/36133/digestive-system</p> <p>Teeth: https://www.twinkl.co.uk/resource/tp2-s-025-planit-science-year-4-animals-including-humans-lesson-3-types-and-functions-of-teeth-lesson-pack</p> <p>Teeth: https://www.bbc.co.uk/bitesize/topics/z27kng8/articles/zsp76yc</p> <p>Teeth: https://www.bbc.co.uk/teach/class-clips-video/science-ks2-teeth-how-they-help-animals-eat/zr8ygwX</p> <p>Effects of drinks on teeth: https://www.bbc.co.uk/bitesize/clips/znrB4wx</p> <p>Resources need to check in school:</p> <p>Teeth model: https://www.ypo.co.uk/product/detail/education-and-learning/anatomy/450280</p>



Investigate the effect that soft drinks can have on our teeth (through the use of egg shells)

Resources:

- Eggs (boiled or sterilised)
- Testing liquids (such as water, vinegar, cola, orange juice and milk)
- Plastic cups

Note: You can use cooked chicken bones, which have been boiled and scrubbed, instead of eggshells.

Method:

1. Peel the eggs, keeping as much of the shells intact as possible. The eggshells will represent teeth.

- Place a small amount of each testing liquid into a plastic cup.
- Place a piece of eggshell into each of the cups. Push it under the surface of the liquid, so that it sinks.
- Leave the eggshells for 24 hours, then carefully pour away the liquids and add fresh liquid to each cup.
- Leave the eggshells for a further week and observe daily.

Demonstrating the digestive system

Resources (per group):

- 1/3 banana
- 1 cream cracker
- Paper cup with hole in the bottom
- 50ml water
- Orange juice
- Sealable plastic sandwich bag
- Scissors
- A stocking (or one leg cut from a pair of tights)
- Paper towels
- A plastic or aluminium tray

Method:

- Put down plenty of newspaper to cover a table, and use a plastic tray to catch any mess.
- Place the cream cracker, banana and orange juice (which represents stomach acid) into the plastic sandwich bag. The bag represents the stomach.
- Add the water, which represents saliva.
- Squeeze all the air out and seal the bag.
- Squeeze the bag for 2 or 3 minutes to smash up the mixture inside. This mimics the action of our stomach walls breaking down food.
- Place the plastic sandwich bag and stocking over a tray. Cut a small hole in the corner of the bag and transfer the contents into the stocking. The stocking represents the small intestine.
- Squeeze the food through the stocking. The liquid that ends up in the tray represents the nutrients that are absorbed by the body and used for growth and energy. The food that remains inside the stocking represents the waste that can't be absorbed by the body.
- Cut the toe off the stocking and squeeze the remaining food out of the end and into the plastic cup. The cup represents the large intestine.
- Finally, push the food (waste) through the bottom of the cup. This represents going to the toilet.

Alternative Version from Teaching Science, see PDF in folder:

Lesson 2 The digestive system

Working scientifically skills: Observing; reporting on findings and from enquiry including oral and written explanations, displays or presentations of results and conclusions
Scientific enquiry type: Identifying; researching using secondary sources

You will need: a model 'mouth' (made from a thick-walled plastic jar with a plastic screw top and six pebbles, a little larger than marbles), bran sugar lumps, bran flakes, a bowl, flour, water, a spoon, cooking oil, a model gullet and stomach (see Technical Tip), a ribbon 3 cm wide and 6 m long to represent the small intestine, a piece of woolly carpet, a ribbon 6 cm wide and 1.5 m long to represent the large intestine, a poster of the digestive system or diagram from a book under the visualiser, a roll of wallpaper.

Getting started

Remind the children about the model teeth you used in the last lesson and say that you are going to make a model mouth and see what happens when you put food in it. Show the children the 'mouth' and say that the pebbles represent the molars. Mix the bran flakes and broken sugar lumps together and show the children. Put them in the model mouth, screw the top on and shake. Say that this action is similar to the action of the molars. After a minute, pour out the contents of the mouth onto a plate, remove the pebbles and let the children describe what has happened to the food. Look for an answer about how it has been made into smaller pieces. Say that they are going to find out what happens to food in the body.

Class activities

- Ask the children what they feel happening to food when it is in their mouth. Look for answers about it being chewed up and it being moistened. Say that the tongue also makes it into pellets and the moisture helps you swallow it. Point to your neck and say that the food goes down a tube called the 'gullet' or 'oesophagus' then point to your body just below your right ribcage and say that it goes into the stomach. Say you are going to make some more models to show them what happens.
- Put some flour in a bowl and mix it with water to make a sloppy dough. Hold it up on a spoon and let it fall off the edge. It should be about 6 cm to 8 cm long. Add some oil to the dough in the bowl to make it a little silky. Say that when we chew, our mouth releases saliva which mixes with the food and makes it slippery so that it is easier to swallow.
- Show the children the model oesophagus and stomach and say that the funnel is another model of the mouth. With help from some children, hold up the display, spoon the flour mix into the funnel and show them it flowing into the tube. Squeeze the sides of the tube to push the dough down into the stomach and say that muscles in the oesophagus push the food into the stomach. When the food gets into the stomach, squeeze it about and say that the action of muscles in the stomach wall churn up the food to mix it.
- Tell the children that when the food has been churned up in the stomach, it passes into a tube called the small intestine and attach one end of the ribbon to the side of the plastic bag to represent it.
- Remind the children about the food being broken up into small pieces and that it is moistened with water. Take the bran and sugar mix, pour into a clear plastic beaker, stir it up and leave it. Say that in the mouth, stomach and small intestine substances called enzymes

1 or digest it if the food is dissolved. Look at the r has dissolved but the bran has not.
y that this is like a magnified part of the small digested food into the blood.
d was undigested and carries on through the y this undigested food helps the muscles push it of the water the body has used in digestion is stored in a cavity called the rectum and released

e drawn on the roll of wallpaper. Show the children arrange your model inside the body as 3.)

Investigate how much iron is in your breakfast cereal

This works best with a fortified breakfast cereal. Check the nutritional labels to find the cereal with the highest iron content.

Resources (per demonstration):

- Fortified breakfast cereal
- Two large, sealable plastic sandwich bags
- Rolling pin
- Water
- Digital microscope (that you can connect to your computer)
- Strong (neodymium) magnet

Method:

1. Place a few handfuls of cereal into a large, sealable plastic sandwich bag.
2. Use the rolling pin to smash the cereal into a fine powder.
3. Transfer the powder to a new sandwich bag. **Note:** This is important, as the bag you were originally using will now almost definitely be damaged and contain small holes.
4. Gradually add some water until the cereal forms a loose paste.
5. To extract the iron, move the strong magnet inside the bag.
6. Carefully rinse the magnet and pat dry.
7. The iron filings won't be visible to the naked eye, but if you use a digital microscope you should be able to see them along the edges of the magnet.