

WOOD FOLD PRIMARY SCHOOL

SCIENCE POLICY

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Next review (date):	Ongoing to reflect practice

A scientific world is one where observation, deduction and hypothesis are central. Children naturally enter into a world of Science. They experiment freely to find answers and it is the role of Science to fulfil this natural curiosity.

Here at Wood Fold Primary School we aim to encourage and channel these processes into developing scientific skills and concepts. Early experiences should create a positive, enquiring and open-minded attitude to learning. These experiences should not be constrained by the skills, knowledge and understanding of Science.

Science is also methodology, a practical way of finding reliable answers to questions we may ask about the world around us. Science in our school is about developing children's ideas and ways of working that enable them to make sense of the world in which they live through investigation, as well as using and applying process skills. They discover ways in which to find the answers to their own questions.

Aims

1. To prepare our children for life in an increasingly scientific and technological world.
2. To develop a respect for the environment; demonstrate care and sensitivity for living things and for their own health and safety.
3. To help our children acquire a growing understanding of scientific ideas.
4. To develop and extend our children's scientific concept of their world.
5. To develop our children's understanding of the international and collaborative nature of Science.
6. To provide a safe and secure environment both inside and outside the classroom where children can develop their working scientifically skills and understanding scientific concepts.
7. To develop a range of investigative and problem-solving skills both inside and outside the classroom.
8. To plan for and deliver experiences such as scientific workshops and trips which promote cultural capital.

9. To provide high-quality, engaging resources such as Ipads, scientific equipment, concept cartoons, VR Headsets and non-fiction/ fiction texts linked to each year group's Science content, which allows children to explore Science in different ways.
10. Linking in with personal development and SMSC, we inspire pupils to think about their own place in the world, their rights and responsibilities to other people and the environment.
11. To provide a Science schema of work which is engaging and progressive in both content and skills.
12. To provide pupils with the opportunity to complete relevant investigations that engage them with their learning and further their understanding.

How is Science planned?

The intent of our Science curriculum is briefly mapped out on Long Term plans and then in more depth on Breadth of Studies. Each Breadth of Study details the National Curriculum objective and the learning that children will acquire in reaching that objective (see below). It also details the working scientifically objectives that will be covered in each year group.

At Wood Fold we use long-term, medium-term, and short-term planning to plan for our groups of learners.

The medium-term plans provide a skeleton framework, outlining what objectives will be covered and how. The short-term plans make use of the individual evaluations that teachers make following a lesson, so we are always planning for appropriate next steps and to inform future lessons.

For each unit of work in Science, there are the following documents:

- **Breadth of Study** – indicates the substantive and /or disciplinary knowledge that they will learn and the sequence of lessons (including component tasks) we will teach to do so.
- **Learning ladder**- reflects the Breadth of Study in ladder format for children and teachers to assess against.
- **Knowledge organiser**- key, sticky knowledge and vocabulary we want the children to learn.
- **Working Scientifically Skills**- outlines the Working Scientifically skills that the children will acquire and develop from EYFS to Year 6. These are progressive across school and are linked to the 5 enquiry types. .
- **Scientific Enquiry overview**- outlines how the children will learn and apply the knowledge. Also, how the children will learn and apply the working scientifically skills. They are organised under the headings of *observation over time, pattern seeking, identifying, classifying and grouping, comparative and fair testing and research using secondary sources*.
- **Medium term plan**- outlines which objectives will be taught and how, with a breakdown of the sequence of learning.
- **Short term plans with evaluations**- session notes.

At Wood Fold, children are provided with the opportunity to explore the world around them through first hand experience, observation and modelling. The children are able to use their experiences to develop their understanding of key scientific ideas and make links.

The subject content specified in the National Curriculum has been carefully selected for each year group; we ensure that year on year there is opportunity to reflect on previous learning and use this to build on new knowledge. With this, we aim for pupils to be able to make connections between new and existing knowledge.

The curriculum is planned to progressively increase pupil's substantive and disciplinary Science knowledge. Pupils learn that there are lots of different ways that scientists gain knowledge through scientific enquiry and children have the opportunity to learn about a range of scientists and their work. Pupils are provided with the opportunity to focus on particular working scientifically objectives and develop their skills in these areas. These are progressive across the year groups and highlight the differences in the three Science strands of Physics, Chemistry and Biology. Working scientifically skills complement the pupils acquisition of knowledge and are not seen as standalone. One example of how we have planned for progression is that in Year 2 the expectation is that children will know how to set up a fair test and do so when carrying out an investigation. In Year 5, the expectation is that children can set up a fair test with more than one variable and can explain to others why a test has been a fair one. The children are exposed the 5 enquiry types throughout each year group.

Each year group will learn about one or more famous scientists. This allows the pupils to have opportunities to develop Science Capital, understanding the role of Science and Scientists (past and present) in shaping the world around us. In KS1, the children study the life and work of Linda Brown Buck, Ole Kirk Christiansen and Charles Macintosh. In KS2, the children study the life and work of Marie Curie, Jeanne Baret, Guillaume Amontons, William Gilbert, Mary Anning, Lewis Latimer, Robert Boyle, Rachel Carson, Katherine Johnson, Galileo Galilei, Isaac Newton, Jane Goodall, Charles Darwin, Alfred Wallace, Libbie Hyman, Marie Maynard Daly and Carl Linnaeus.

Using carefully planned Breadth of Study and Learning Ladders (see below), the teachers in each year group plan for depth of knowledge using Rosenshine's Medium Term Planning, ensuring component parts (tasks in different lessons) are delivered effectively to achieve the composite task. For example, in wanting the children to find out and describe how plants need water, light and a suitable temperature to grow and stay healthy (composite task), a component task is to carry out an investigation as to where a plant will grow best when exposed to a range of different conditions.

Year 3					
Biology			Chemistry	Physics	
Animals, including humans	Plants	Plants	Rocks	Forces	Light
<ul style="list-style-type: none"> Skeleton and muscles Nutrition Exercise and health 	<ul style="list-style-type: none"> Plant life Basic structure and functions 	<ul style="list-style-type: none"> Life cycle Water transportation 	<ul style="list-style-type: none"> Fossil formation Compare and group rocks Soil 	<ul style="list-style-type: none"> Different Forces Magnets 	<ul style="list-style-type: none"> Reflections Shadows
<ul style="list-style-type: none"> Know about the importance of a nutritious and balanced diet for animals and humans. Know that animals (including humans can be grouped according to what they eat) Know about the 5 food groups and the proportions of each needed to create a healthy, balanced diet. Know about the skeletal and muscular system of a human and understand that not all animals have one. Know how muscles work. 	<ul style="list-style-type: none"> Know the function of different parts of flowering plants and trees Know what plants need for growth. 	<ul style="list-style-type: none"> Know how water is transported within plants Know the role flowers play in the life cycle of flowering plants. 	<ul style="list-style-type: none"> Observe different rocks and explore how they might have changed over time. Compare and group rocks based on their appearance and physical properties, giving reasons Know what fossils are and how they are formed Know about and explain the difference between sedimentary, metamorphic and igneous rock Know what 'soils' are and make comparisons between them. 	<ul style="list-style-type: none"> Know about and describe how objects move on different surfaces Know and compare how different forces work Know about William Gilbert's theory and explain what magnetic poles are Know what magnets do and why they are used. Know about and explain how magnets attract and repel Predict whether magnets will attract or repel and give a reason Compare and group everyday materials according to whether they are attracted to a magnet. 	<ul style="list-style-type: none"> Know what a light source is and how light allows us to see Know that light is needed in order to see and is reflected from a surface Know that dark is the absence of light Know about the danger of direct sunlight and describe how to keep protected Demonstrate how a shadow is formed and explain how a shadow changes shape

Working Scientifically 2022-23

Year 3	Plants	Animals, including humans	Rocks	Forces and Magnets	Light
	<p>Scientific Question: Explain the lifecycle of a flowering plant. Research Observation over time</p> <p>Scientific Enquiry: Classify flowers, children to create their own criteria. Identifying, classifying and grouping</p> <p>Observe celery/white carnations in coloured water. Observation over time Comparative and fair testing</p>	<p>Scientific Question: How can we group the food that we eat? Identifying, classifying and grouping</p> <p>Scientific Enquiry: Can people with longer legs run faster? Pattern seeking</p> <p>Look at food packaging to identify the amount of nutrients in different food items. Research</p>	<p>Scientific Question: Which soil absorbs the most water? Comparative and fair testing</p> <p>Scientific Enquiry: How does soil separate into different layers in water. Observation over time</p> <p>Research on igneous, metamorphic and sedimentary rocks and which rocks may fall into these categories. Research</p> <p>Children to use make observations of rocks using microscopes and a hand lens. Classify using their own criteria. Identifying, classifying and grouping</p> <p>Investigate what happens when rocks are rubbed together and what changes occur when they are in water. Comparative and fair testing</p> <p>Identify the different types of soil, their properties and what they are used for. Research</p> <p>Investigate how much water is absorbed with each type of soil. Comparative and fair testing</p>	<p>Scientific Question: Which surface is best to stop you slipping? Explain why. Comparative and fair testing</p> <p>Scientific Enquiry: Find out how magnets are used in everyday life. Research</p>	<p>Scientific Question: How does the distance between the shadow puppet and the screen affect the size of the shadow? Comparative and fair testing Pattern seeking Observation over time</p> <p>Scientific Enquiry: How does the amount of light affect how much and how well we can see? Research</p>

Year 3- Science

Year 3: Science – Plants		
The grid below helps to identify the journey pupils make towards mastering this objective. It can be used by the teacher to keep an on-going check on progress or more likely placed in the pupils' books so that they can keep their own checks.		
<ul style="list-style-type: none"> Identify and describe the functions of different parts of flowering plants: roots/stem/trunk, leaves flowers Explore the requirements of plants for life and growth (air, light, water etc.) Investigate the way in which water is transported within plants Explore the part that flowers play in the life cycle of flowering plants, including pollination, seed formation and seed dispersal. 	Me	My Teacher
Explain the lifecycle of a flowering plant.		
To explain the role flowers play in the life cycle of flowering plants.		
To investigate how water is transported within plants.		
To explain what plants need for growth.		
To identify and describe the functions of different parts of flowering plants.		

The rungs on the ladder are created to ensure that the children can answer the Enquiry Question at the top of the ladder with depth and with sound understanding. Each rung on the ladder builds to form the objective set out in the National Curriculum that we want the children to learn and retain; to achieve this, teachers use Medium Term Planning which follows the structure linked to Rosenshine’s Principles with sections set out for teachers to consider how they will break down into smaller steps. This is a careful sequence of knowledge which builds on prior knowledge. The teaching for each ‘rung’ will involve multiple sessions (containing component tasks) to provide depth of knowledge for that learning goal.

Learning Ladders, which set out the sequence of learning objectives for a unit, are shared at the start of each lesson. The teacher will highlight the specific rung that the children are working on and share the learning objective for that lesson as well as the key concept they will be covering. In addition, there will be discussion around where this lesson fits into the sequence of learning, what they have done so far and where they are going next, in order that they are finally able to meet the overall objective from the National Curriculum, as well as respond to the enquiry question at the top of the ladder.

The ladders enable the children to see that the lessons are progressive and successive with one lesson building upon the next allowing them to build a schema of knowledge. It is crucial the children see the connections between their lessons in order for them to deepen and widen their understanding, rather than see each lesson as a separate chunk of information detached from the previous one.

Enquiry Question

At the top of each ladder in Science there is an ‘Enquiry Question’. The children are expected to provide a written response to the question using all of the knowledge they have acquired in the unit.


Year 2: Science – Living things and their habitats		
The grid below helps to identify the journey pupils make towards mastering this objective. It can be used by the teacher to keep an on-going check on progress or more likely placed in the pupils' books so that they can keep their own checks.		
<ul style="list-style-type: none"> Understand the difference between things that are living, dead and have never been alive. Understand that most living things live in habitats to which they are suited. Know a variety of different plants and animals and understand their habitats (including microhabitats). Understand simple food chains. 	Me	My Teacher
How does the habitat of the Arctic compare with the Desert?		
To understand what food chains are.		
To understand the terms 'habitat' and 'micro-habitat' identifying the different types of plants and animals living in them.		
To know why animals are suited to their habitat and make comparisons.		
To explain the difference between things that are living, dead and have never been alive.		

Year 3: Science- Rocks, Soils and Fossils		
The grid below helps to identify the journey pupils make towards mastering this objective. It can be used by the teacher to keep an on-going check on progress or more likely placed in the pupils books so that they can keep their own checks.		
<ul style="list-style-type: none"> Compare and group together different kinds of rocks on the basis of their appearance and simple physical properties. Describe in simple terms how fossils are formed when things that have lived are trapped within rock. Recognise that soils are made from rocks and organic matter. 	Me	My Teacher
Which soil absorbs the most water? Explain how you know.		
To know what 'soils' are and make comparisons between them.		
To understand what fossils are, how they are formed and whose fossils are found in sedimentary rock.		
To compare and group different rocks on their appearance and physical properties.		
To observe different rocks and explore how they might have changed over time.		

This is an example of what it may look like in practice:

KS1

How does the habitat of the Arctic compare with the Desert?



The Arctic and desert are both extreme habitats and are very different from each other. The temperature in the Arctic is colder than the desert. Also in the desert it is scorching hot. The ground in the desert is hot and the ground in the Arctic is cold. However the ground in the desert is also very sandy. Both habitats are home to a number of animals which are an Arctic fox and a camel. So then it can blaze in with ice so then hunters can not catch them. However sand cats blaze in with sand so then their prey can not eat them. Also other animals like camels blaze in the sand. Also like a meerkat. Lots of animals have different temperatures. Dry dusty deserts like the Kalahari Desert is very warm. Cold icy lands like the Arctic it is freezing.

The two habitats are similar because they do not rain that much.

KS2

Analysis Question:
Which soil absorbs the most water?

There are lots of different types of soil. First, there is sandy soil. It lets water drain through easily. It also has large particles and feels gritty. Secondly, there is silty soil which turns into mud when it gets wet and blows away easily when it gets wet. It feels smooth and soft. Next is clay soil that is dense and heavy and can be moulded like modelling clay. It feels smooth and sticky. Peaty soil contains a lot of organic matter and water. It feels springy. Loam soil is a mixture of organic matter and equal amounts of sand and silt with a little clay. It feels soft and crumbly. Loam is good for growing plants because it holds water and nutrients, but also allows excess water drain away. Surprisingly, there are three different soil types that are peaty soil, clay soil and loam.

Retrieval Tasks

Teachers plan for recall tasks and retrieval practice in each lesson to link back to prior learning both from the previous lessons or content from previous years. Teachers also plan to use dual-coding within their lessons to promote the retention of knowledge as well as which WALKTHRUS they will use and plans for the daily/ weekly/ monthly reviews (see T&L Handbook).

Knowledge organisers (Appendix 1) are also provided and used in the planning process to ensure all aspects of the objective is covered. Teachers use the knowledge organisers to inform planning as they outline the key content and vocabulary that should be taught within the lessons.

Science is taught in each year group every term across the year, in addition, children are expected to independently complete Science retrieval activities in their Retrieval books; this is to ensure that they are continuously exposed to Scientific content, of which they should be able to retrieve from memory.

Pre- Learning Tasks

In Science, children will be tested on any relevant information they have been taught previously which should link to their new learning. These PLT's allow teachers to determine whether prior knowledge and understanding is secure in this unit before starting; it also identifies any common misconceptions. The PLT is printed on green paper and is stuck into the children's books at the beginning of the new topic or learning objective.

Implementation

The Science curriculum at Wood Fold embeds core knowledge, concepts and skills. Teachers have the expertise necessary to support all pupils in learning the intended curriculum and addressing any gaps in knowledge. This is done through a mixture of whole- class teaching and individual or group activities.

Teaching in Science is guided by the principles set out in 'Rosenshine's Principles in Action' to support their practice and maximise learning in the classroom environment. The Principles of Instruction have been streamlined into four strands: Sequencing concepts and Modelling, Questioning, Reviewing Material and Stages of Practice. These strands provide our teachers with the coherence they need to deliver quality first teaching. (See T&L Handbook)

Information is clearly presented to pupils and teachers check understanding effectively and systematically. The curriculum is designed to allow pupils to transfer key knowledge into long term memory by having regular opportunities to revisit learning. Teachers do this by building on prior knowledge by providing a variety of forms of retrieval practice, recalling and applying previously learned material.

Each lesson in Science begins with a brief review of previous learning to reactivate recently acquired knowledge. The remainder of the lesson should then be used to build on prior knowledge, exposing new layers of a concept. At Wood Fold, we use daily, weekly and monthly reviews as a tool for retaining 'sticky knowledge' (Knowledge that stays in our long-term memory).

Children are also provided with knowledge- rich, high-quality books relating to their Science learning to give children the opportunity to practise and develop reading across the curriculum; they are encouraged to use reading to further their own knowledge. This gives the children the chance to decide for themselves what the key information is on a topic from what they have read.

Practical work is of high importance within our Science Curriculum at Wood Fold. The opportunity to work practically allows the children to build their conceptual understanding. It also allows the children to develop their Scientific skills that they need to work as Scientists and illustrate how scientific enquiry develops the body of scientific understanding.

Within the Science Curriculum at Wood Fold, children are provided with the opportunity to develop their Working Scientifically skills which they can then use scientific enquiry to apply these skills. Children have exposure to each of the 5 enquiry types and use these to answer a range of scientific questions,

Teachers use ongoing assessment opportunities to check understanding and to inform teaching, for example, by providing instant feedback, asking process and probing questions to

check for understanding. Teachers and leaders regularly speak with pupils to ascertain levels of confidence in the subject and whether they can speak confidently about that they have learnt and why.

Reading throughout the Science curriculum

At Wood Fold we believe that reading is a fundamental skill. The children are given the opportunity to practise and develop this skill across the Science curriculum and are encouraged to use reading to further their own knowledge. Therefore, high quality texts are provided for the children to use throughout Science teaching and learning. This gives the children the chance to decide for themselves what the key information is on a topic from what they have read. Some examples of activities that pupils may be asked to do to develop their understanding of a topic include:

- finding and highlighting key vocabulary in context
- creating a fish bone diagram
- answering challenge questions
- writing a lengthy response to a question once they have found the relevant information
- responding to non-fiction questions based upon their learning

Impact

At Wood Fold, all children are given equal opportunities to achieve in Science through a well-constructed curriculum. The impact of our curriculum is measured by how well children achieve in knowing more, remembering more and doing more. This is reflected in their work that is consistently of a high quality. We also know this because assessment tools such as formative assessment, pupil voice, written responses to Enquiry questions, End of Unit Assessments (Appendix 2), completion of learning ladders and responses to retrieval practice tasks demonstrate this evidently. After completing a unit of work, children will also answer a scientific question. This will allow children to use the knowledge they have gained throughout the unit of work when answering the scientific question. This can be used as an assessment tool and also promotes high quality writing in Science.

The End of Unit Assessment informs the teacher of which areas of learning each child still has gaps, and these are noted down on an assessment grid (see below). Teachers will then decide on what corrective action is needed to ensure that the child is able to achieve the objective(s) not met. This may include re-teaching areas of learning if substantial class gaps occur or setting targeted homework / research tasks to address specific gaps for individuals. Results on these assessments demonstrate retention of knowledge and sound understanding.

Living things and their habitats- End of Topic Assessment – Spring 2

Objective	Test Question No.	Children names who DID NOT answer correctly	Task to address errors
To explain the difference between things that are living, dead and have never been alive.	Q1 Q2		Sort the pictures into living, dead, never been alive.
To understand the terms 'habitat' and 'micro-habitat' identifying the different types of plants and animals living in them.	Q3 Q4 Q5 Q6 Q7		Recap the different between a habitat and a micro-habitat. Name different habitats and micro-habitats and animals that live in these. True or false, what does a habitat need to provide.
To know why animals are suited to their habitat and make comparisons.	Q8 Q9 Q10		Read through the information on the flashcards. Discuss why the animals are suited to their habitats.
To understand what food chains are.	Q11		Reteach food chains. Create food chains task.

At the end of the year, teachers are asked to make a summative assessment of the children in Science, by completing the following grid.

Y2M Science End of Year Assessment Information

Initials of children working towards the expected standard	Initials of children who are showing some more in-depth knowledge

This grid identifies those who are working towards the expected standard, those who are showing more in- depth knowledge, and consequently those at expected. This information is passed to subject leaders who will have a secure understanding of children’s Science knowledge across school.

Learning Postcards

Another form of measuring impact is with the Learning Postcards. At the end of each half term, a ‘Learning Postcard’ is sent home. This will either be a History, Geography or Science postcard. This is an opportunity for the children to show their parents what they have learnt in a particular subject over the past half term, as well as provide the parents with more of an opportunity to understand the content of what is taught. These postcards are returned to school and stuck into the child’s Science Book as a final piece to their learning journey.

APPENDIX 2 – Example of an end of unit assessment (Y4 Animals, including humans)

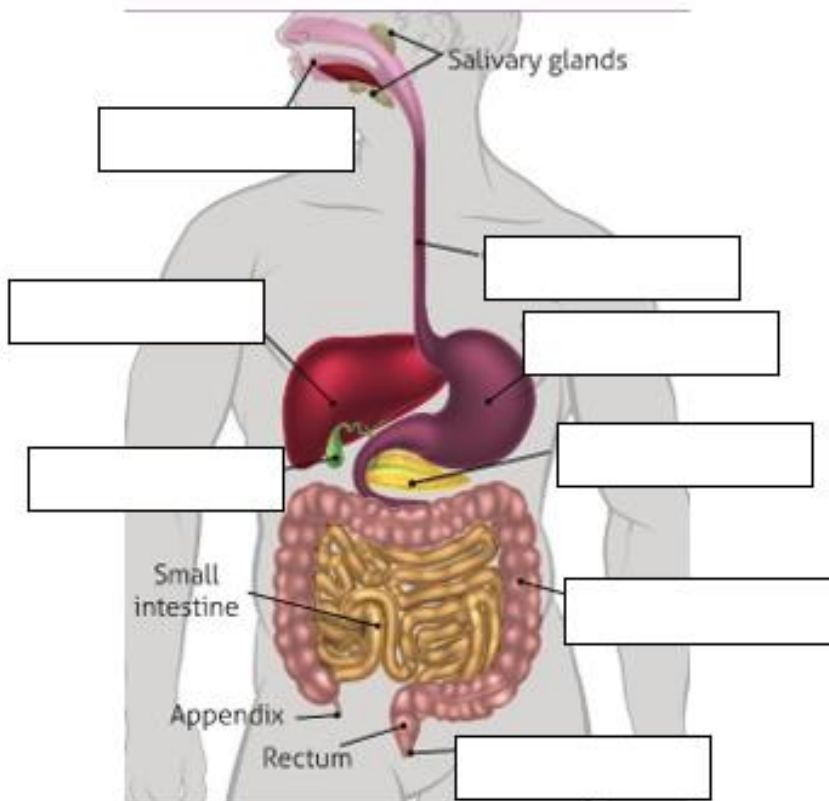


Science – Animals, including humans
End of Topic Assessment
Year 4 – Autumn Term

Name:	
Class:	
Date:	
Score: Out of 40	

Q1) Label the digestive system.

(6 marks)



mouth

anus

large intestine

pancreas

stomach

gall bladder

liver

oesophagus

Q2) Match the label to the role that it plays in the digestive system.

(6 marks)

A tube that connects the throat to the stomach	_____
Holds food after ingestion before passing it through to the small intestine	_____
Allows us to talk, to smile or frown, and to whistle.	_____
Stores and concentrates bile, which is a yellow-brown digestive enzyme	_____
Releases digestive juices called enzymes	_____
Could be described as part of your waste disposal system	_____
The opening where your bowel movements (also known as poo) come out.	_____
Cleans your blood and produces important digestive liquid called bile	_____

Gall bladder

Anus

Liver

Oesophagus

Pancreas

Stomach

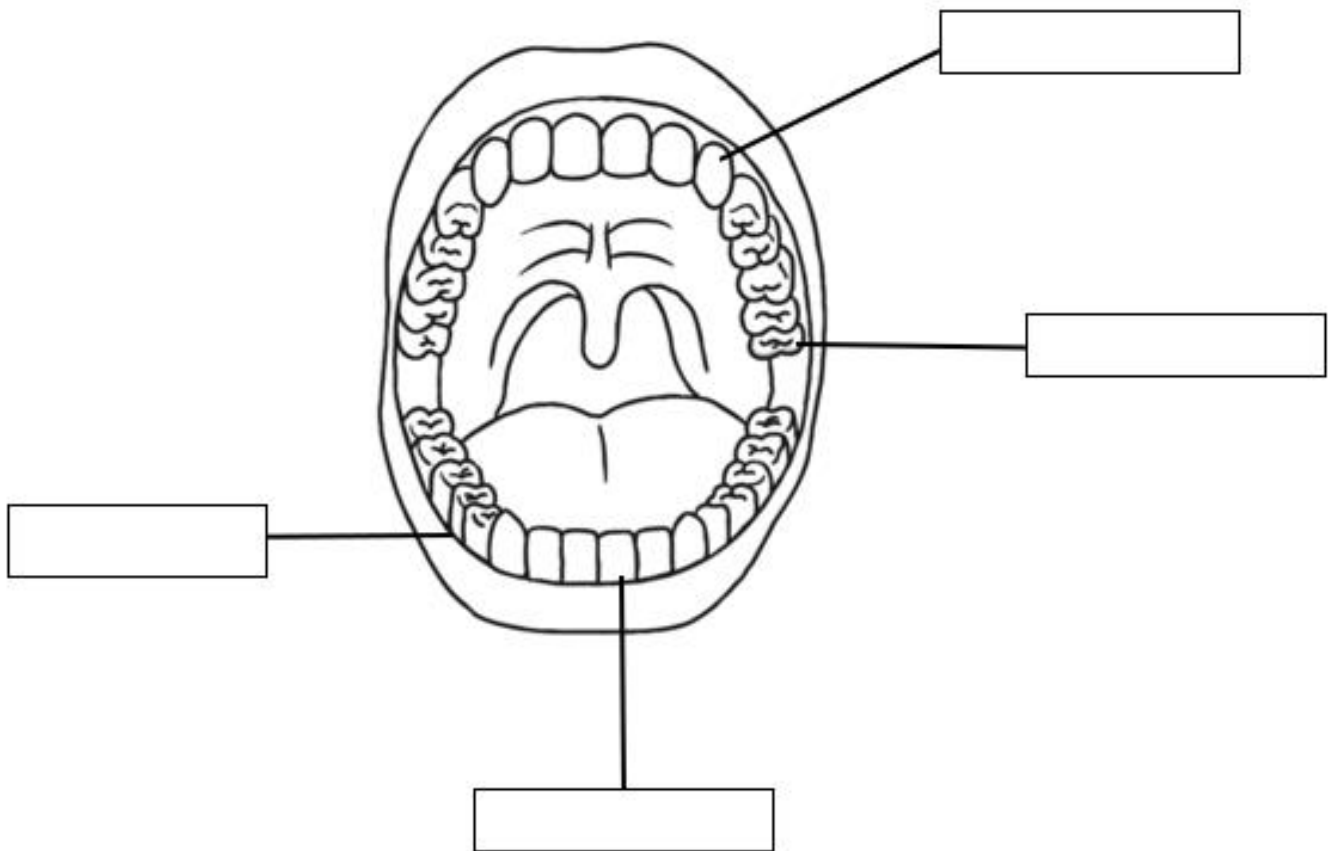
Mouth

Large intestine

Q3) How many incisors does a human have? (1 mark)

Q4) What is the name of the white, outside part of the tooth? (1 mark)

Q5) Label the different teeth. (3 marks)



Incisor

Canine

Molar

Pre-Molar

Q6) Explain the function of each tooth:

 (4 marks)

Incisor:

Canine:

Molar:

Pre-Molar:

Q7) Following the investigation, you carried out, what liquid would cause the most tooth decay? (1 mark)

Q8) What liquid is best for your teeth? (1 mark)

Q9) Write an explanation on how we can take care of our teeth. (2 marks)

Q10) Explain what is meant by the following words and give an example of an animal that would belong in each category: 3 (3 marks)

Carnivore

Animal: _____

Herbivore

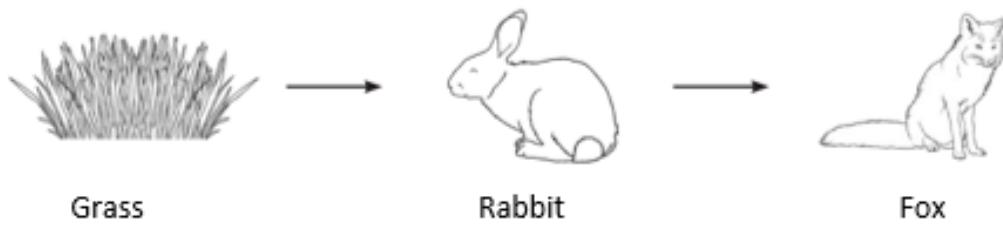
Animal: _____

Omnivores

Animal: _____

Q11) Explain the similarities and differences between the diet and teeth of a sheep, lion and human. (4 marks)

Here is a simple food chain.



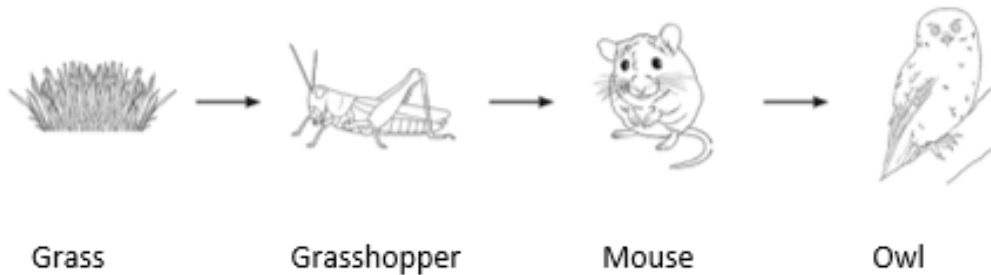
Q12) In this diagram what do the arrows show?

(1 mark)

Q13) What is the first item in any food chain called?

(1 mark)

Look at this food chain.



Q14) Which is the predator?

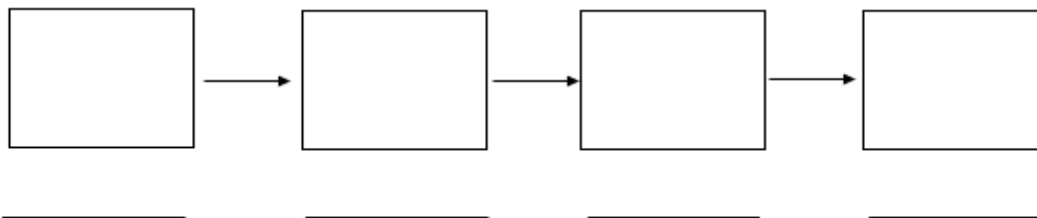
(1 mark)

Q15) Which is the prey?

(1 mark)

Q16) Construct your own food chain.

(4 marks)



Isaac Newton

- Isaac Newton was born in England in 1643.
- Isaac attended school where he was an adequate student.
- Isaac grew up mostly alone. For the rest of his [life](#) he would prefer to work and live alone focused on his writing and his studies.
- Isaac had to leave Cambridge University from 1665 to 1667 because of the Great Plague. He spent these two years in study and isolation developing his theories on calculus, gravity, and the laws of motion.



- Isaac Newton made many scientific discoveries and inventions throughout his career.
- Legend has it that Sir Isaac Newton made one of his most important discoveries when an apple fell from the tree he was sitting under and hit him on the head. This story isn't quite true, but a falling apple did lead to one of Newton's discoveries.
- Newton discovered that Earth must have a force which pulls things down instead of letting things float upwards.
- We call this force gravity. Newton discovered that gravity attracts all objects towards each other. The bigger an object, the more gravity it would have.
- He developed this theory to work out that gravity kept the moon in orbit around Earth.
- Sir Isaac Newton also discovered something known as the three laws of motion.
- **The first law** is something that is still, will remain still unless a force is applied to it. It also states that an object that is in motion (moving) will continue to move in the same direction and at the same speed unless a different force is applied to it.
- **The second law** states that acceleration (speeding up) happens when a force is applied to an object. The heavier the object, the more force will be needed to accelerate the object.
- **The third law** states that for every action, there is an equal and opposite reaction. This means forces work in pairs. For each force applied, another force will act in the opposite direction.