

Biology Knowledge Sequencing

By the end of key stage FOUR we want all students of Biology to know and do the following key things: make confident use knowledge & understanding of key terms in Biology; have practical competency and knowledge for all required practical activities and experiments; interpret & analyse qualitative and quantitative data with reasoning; make coherent conclusions; make well-reasoned judgements; evaluate and refine practical procedure.

Prior Knowledge In KS4, students of Biology will build on the following prior learning: Key Stage Three understanding of key processes, such as fundamental biological reactions of photosynthesis and respiration, living organisms relating to cell structures, ecosystems and cell structures; Key Stage Three skills of analysis and evaluation; maths skills, including calculating percentages and averages; simple evaluation of practical procedure; knowledge of key equipment; consideration of variables.

Future Knowledge The Curriculum in KS4 Biology will prepare students for the following future learning: Utilise knowledge in well-reasoned explanations; independently refine and evaluate practical procedure; analysis utilising wider maths skills.

	Term	Key Knowledge	Assessment Focus
Year 10	1	Build on microbes and drugs and health modules to develop knowledge of prevention and treatment of communicable diseases. To include the development and trialling of drugs.	Vaccination long answer question Infection and response test.
	2	Build on cells and tissues and photosynthesis to develop knowledge of a range of non-communicable diseases. To include risk factors and consideration of correlation and causation. Develop knowledge & understanding, and well-reasoned judgements, about Bioenergetics: photosynthesis. Required Practical Photosynthesis interpretation and analysis of data and coherent conclusions, evaluate and refine RP procedure.	Non-communicable diseases long answer question. Non-communicable diseases test. Photosynthesis long answer question.
	3	Build on knowledge from units on Organisation and Infection and Response to develop knowledge on Bioenergetics: Respiration; confident knowledge and understanding, application to wider scenarios, depth of description. Focus on extended response.	Respiration long answer question Photosynthesis and respiration test.
	4	Build on knowledge from units on Organisation and cells to develop knowledge on the human nervous system. Practical skills: measuring reaction times. Maths skills: interpret data to develop conclusions. Further develop confident knowledge and understanding of cells and organisation, disease and bioenergetics.	Reflex arc long answer question. The human nervous system test. Year 10 examination
	5	Build on cells and non-communicable disease to develop knowledge on homeostasis, offering well-reasoned judgements. Relate medical intervention of dialysis to ethical considerations. Required Practical Germination to plan and utilise apparatus techniques.	Hormones long answer question
	6	Continue to develop knowledge & understanding about Homeostasis, offering well-reasoned judgements. Build on Cells and cell division to develop knowledge of reproduction and the genome.	Homeostasis test
Year 11	Term	Key Knowledge	
	1	Continue to develop knowledge & understanding of reproduction to include inheritance and the ethics of genetic screening.	Genetic screening long answer question Reproduction test
	2	Build on Inheritance and evolution to develop knowledge of variation and evolution. Model natural selection, consider data related to twin studies and consider the ethics of genetic engineering. Build on knowledge from units on Organisation and Infection and Response. Bioenergetics: Respiration; confident knowledge and understanding, application to wider scenarios, depth of description. Focus on extended response.	Natural selection long answer question. Y11 mock examination
	3	Build on reproduction, variation and evolution to develop knowledge of genetics and evolution. Consideration of evidence for scientific theories and classification.	Variation, genetics and evolution test.

	4	Build on environment and adaptation, variation, genetics and evolution to develop knowledge of ecology. Required Practical Field Investigations to plan, implement Apparatus and Techniques, develop sampling techniques and use them in more complex contexts, such as unfamiliar ecological habitats. Relate knowledge from previously learned topics to wider scenarios relating to Ecology. Focus on application of learned understanding. Concreting of learned understanding. Planning of possible extended response titles. Practice maths skills, with a focus on application of examination style questions. Practice apparatus and techniques application.	Quadrats long answer question Y11 Mock examination Ecology test	
	5	Focus on application of learned understanding. Concreting of learned understanding. Planning of possible extended response titles. Practice maths skills, with a focus on application of examination style questions. Practice apparatus and techniques application.	External examinations	
Opportunities for developing literacy skills and developing learner confidence and enjoyment in reading		Links to British Values	Links to Careers	Links to Other Personal Development
<p>FROM THE LIBRARY</p> <p><i>Fighting Infectious Disease</i>; Sally Morgan-616.905</p> <p><i>Fighting Diseases</i>; Robert Sneddon-616.9</p> <p><i>Health and Disease</i>; Franklin Watts-301</p> <p><i>Loos save Lives</i>; Seren Boyd-363</p> <p><i>Story of the Human Body: The Evolution of Health and Disease</i>; Daniel Lieberman-612</p> <p><i>Breast Cancer</i>-362.1</p> <p><i>Kate Smokes</i>-613.8</p> <p><i>How Do Drink and Drugs Affect Me</i>-615</p> <p><i>The Body</i>-612</p> <p><i>Breathing</i>-612</p> <p><i>Evolve or Die</i>-500</p> <p><i>Lungs</i>-612</p> <p><i>Complete Book of The Brain</i>-612</p> <p><i>Inner Workings Of The Grey Matter</i>-612</p>		<p>Mutual respect: Debates about ethical and moral issues, such as whether we should test drugs on animals, or whether nuclear bombs should be developed. All students are able to share their viewpoints respectfully.</p> <p>Rule of law: When conducting practical work, we have to follow rules about Health and Safety to ensure the safety of everyone in the laboratory. When conducting experiments involving animals, we have to abide by laws to ensure that animals are not treated cruelly. When using radioactive sources, certain members of</p>	<p>Links to a broad range of careers are made at the start of each new topic area. They are given to students on their learning objectives sheets and projected on the introductory slide of each new topic.</p>	<ul style="list-style-type: none"> • Developing a healthy lifestyle. • Developing healthy relationships. • Develop a set of positive personal traits, dispositions and virtues that informs their motivation and guides their conduct so that they reflect wisely, learn eagerly, behave with integrity and cooperate consistently well with others. • Develop confidence, resilience and knowledge so that they can keep themselves mentally healthy. • An inclusive environment that

<p><i>Bulging Brains-500</i> <i>Hormones-612.405</i> <i>Hormones-612.4</i> <i>Diabetes-362.1</i> <i>Living With Diabetes-362.1</i> <i>Everything You Ever wanted To Know About Periods-613</i> <i>Amazing Voyage Of The Cucumber Sandwich-612.3</i> <i>Digesting-612.3</i> <i>Dictionary Of Human Anatomy-612</i> <i>Eating-613.2</i> <i>Disgusting Digestion-612</i> <i>Fertility and Reproduction-176</i> <i>Making Life-612</i> <i>Cells, Division and Genetics-571.84</i> <i>Celle and Systems-574</i> <i>Darwin-576</i> <i>Darwin For Beginners-576</i> <i>Evolution-576</i> <i>Origin Of Species-576</i> <i>Life-576</i> <i>Origin Of Species and the Voyage of the Beagle-576</i> <i>Benefits of Bacteria-616</i> <i>Evolve or Die-500</i> <i>Fighting Infectious Disease-616.9</i> <i>Our Changing population-305</i> <i>Planet under Preasure-363</i></p>	<p>the department are trained as Radiation Protection Supervisors to comply with Health and Safety laws.</p> <p>Tolerance: Throughout the Science curriculum, scientists from different backgrounds will be discussed, including the challenges they faced because of their beliefs, viewpoints and protected characteristics. When discussing contentious issues, for example theories about the formation of the Universe, all viewpoints are considered while teaching the scientifically accepted ideas. Debates about ethical and moral issues, such as whether we should test drugs on animals, or whether nuclear bombs should be developed. All students are able to share their viewpoints.</p> <p>Democracy: Science is a democratic discipline. When developing new theories, it has to be accepted by a wide number of scientists before it is consider a scientific theory. Similarly, all experimental work has to be</p>		<p>meets the needs of all pupils, irrespective of age, disability, gender reassignment, race, religion or belief, sex or sexual orientation.</p>
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<p><i>Poulation-910</i> <i>Global Waste-363.72</i> <i>Waste Issues-363</i></p>	<p>peer reviewed by others before it is accepted.</p> <p>Individual liberty: Students have opportunities that will allow them to use their knowledge and understanding to pose scientific questions and define scientific problems. Students are introduced to the idea that Science cannot provide the answers to some questions, for example, where beliefs, opinions and ethics are important.</p>		
<p>Extra-Curricular and Co-Curricular Opportunities</p>		<p>Links with other subjects in the curriculum</p>	
<p>Lego league</p> <p>Rotary tech challenge</p> <p>Arkwright scholarship</p> <p>Nancy Rothwell award competition</p> <p>Science week activities and poster competition.</p> <p>Kerboodle – additional resources and textbooks</p> <p>Educake</p>	<p>Maths - classifying, counting, measuring, calculating, estimating, tables, graphs, statistics, algebra</p> <p>Geography – Combustion, pollutants, environmental impacts, clean drinking water, product life cycles, food chains, biodiversity, climate change</p> <p>Philosophy and ethics – ethical discussions around reproduction, vaccination, stem cells, genetic testing</p> <p>History – development of microscopes, medicines</p> <p>Design and technology – Healthy diet</p> <p>Personal development – healthy eating, impact of drugs and smoking</p> <p>English and MFL: etymology of words</p>		

Chemistry Knowledge Sequencing

By the end of key stage FOUR we want all students of Chemistry to know and do the following key things: Hold confident knowledge & understanding of key terms and concepts in Chemistry; apply to scenarios; give competent description; have thorough practical skills; analyse qualitative & quantitative data with reasoning; manipulate data; draw coherent conclusions; make well-reasoned judgements; evaluate practical procedure with growing independence, link key concepts

Prior Knowledge In KS4, students of Chemistry will build on the following prior learning: KS3 knowledge and understanding, ability to think scientifically, appreciation of key practical methods; awareness of variables; KS3 mathematical skills, awareness of the purpose of evaluation; justified conclusion; analysis of data with description of trends; key apparatus and techniques; appreciation of lab safety and safe use of chemicals

Future Knowledge The Curriculum in KS4 Chemistry will prepare students for the following future learning: Confident knowledge & GCSE understanding; application to wider scenarios, such as Chemistry in Industry and Chemistry of the Earth; depth of description; high competency for practical skills; analysis of qualitative & quantitative data with reasoning; manipulation of data; coherent conclusions; well-reasoned judgements; evaluate & refine practical procedure independently, link key concepts.

	Term	Key Knowledge	Assessment Focus
Year 10	1	Understanding and application of Electrolysis. Links to use in everyday life, such as extracting metals from their ores. Required practical: Electrolysis	Extracting aluminium LAQ Electrolysis test
	2	Understanding and application of quantitative chemistry. Mathematics skills: unit conversions; rearranging equations. Applying quantitative analysis to examination questions. Links to quantitative use in industry; % yield/atom economy	Making copper chloride LAQ Titration LAQ Chemical calculations midtopic test Chemical calculations test
	3	Understanding and application of quantitative chemistry. Required Practical: Acid-base Titration – developing practical skills unfamiliar equipment. Mathematics skills; unit conversions; rearranging equations. Applying quantitative analysis to questions.	Energy changes LAQ Energy changes test
	4	Consolidation of prior learning in preparation for mock examination. Modelling application of understanding to unfamiliar questions. Review and feedback of understanding through mock exam analysis	Year 10 assessment
	5	Understanding and application of chemical reactions and their rates. Practical skills, graph skills, data handling, maths skills. Linking subject to careers. Application of theory to practical. Testing hypothesis. Understanding of variables	Rate of reaction LAQ
	6	Understanding and application Energy & Equilibria. Importance in everyday life (Haber Process/Fuel Cells). Maths Skills in energy calculations. Linking concepts; compromise between rate and yield. Required Practical: recording temperature changes. Mathematics: graphs skills.	Rates and equilibria test
Year 11	Term	Key Knowledge	
	1	Understanding & application of Carbon Chemistry. Links from Geography/KS3 source of oil, building upon knowledge to link to uses.	Fractional distillation LAQ Chemical analysis test

	2	Consolidation of prior learning in preparation for mock examination. Modelling application of understanding to unfamiliar questions. Review and feedback of understanding through mock exam analysis	Year 11 assessment	
	3	Understanding the history and chemistry of the atmosphere. Required practical: Distillation, the purification of water.	History of the atmosphere LAQ Chemistry of the atmosphere test	
	4	Understanding and application of the chemical tests. Required Practical: Linking chemical testing to potable water topic. Recall of prior learning (Chemical Formulae and Ions). Practical skills and analysis of unknowns – systematic identification. Consolidation of prior learning in preparation for mock examination. Modelling application of understanding to unfamiliar questions. Review and feedback of understanding through mock exam analysis	Water treatment LAQ Using resources test	
	5	Consolidation of prior learning and application to exam questions in preparation for external exams through use of past paper questions.	External examinations	
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Opportunities for developing literacy skills and developing learner confidence and enjoyment in reading		Links to British Values	Links to Careers	Links to Other Personal Development
<p>FROM THE LIBRARY</p> <p><i>Energy And Chemical Change-540</i></p> <p><i>Heat And Combustion-540</i></p> <p><i>Hydrogen and The Noble Gas-540</i></p> <p><i>Elements Compounds and Mixtures-541</i></p> <p><i>Acids Bases and Salts-546</i></p> <p><i>Air and Water-546</i></p> <p><i>Chemicals in Action-546</i></p> <p><i>Periodic Kingdom-546.8</i></p>		<p>Mutual respect: Debates about ethical and moral issues, such as whether we should test drugs on animals, or whether nuclear bombs should be developed. All students are able to share their viewpoints respectfully.</p> <p>Rule of law: When conducting practical work, we have to follow rules about Health and Safety to ensure the safety of everyone in the laboratory. When conducting experiments involving animals, we have to abide by laws to ensure that animals are not treated cruelly.</p>	<p>Links to a broad range of careers are made at the start of each new topic area. They are given to students on their learning objectives sheets and projected on the introductory slide of each new topic.</p>	<ul style="list-style-type: none"> • Developing a healthy lifestyle. • Developing healthy relationships. • Develop a set of positive personal traits, dispositions and virtues that informs their motivation and guides their conduct so that they reflect wisely, learn eagerly, behave with integrity and cooperate consistently well with others. • Develop confidence, resilience and knowledge so that they can keep themselves mentally healthy.

<p><i>Principals of Organic Chemistry-547</i></p> <p><i>Air Pollution: Our Impact on the Planet-363.7</i></p> <p><i>Environmental Hazzards-363.7</i></p> <p><i>Global Climate Change-363.7</i></p>	<p>When using radioactive sources, certain members of the department are trained as Radiation Protection Supervisors to comply with Health and Safety laws.</p> <p>Tolerance: Throughout the Science curriculum, scientists from different backgrounds will be discussed, including the challenges they faced because of their beliefs, viewpoints and protected characteristics. When discussing contentious issues, for example theories about the formation of the Universe, all viewpoints are considered while teaching the scientifically accepted ideas. Debates about ethical and moral issues, such as whether we should test drugs on animals, or whether nuclear bombs should be developed. All students are able to share their viewpoints.</p> <p>Democracy: Science is a democratic discipline. When developing new theories, it has to be accepted by a wide number of scientists before it is consider a scientific</p>		<ul style="list-style-type: none"> • An inclusive environment that meets the needs of all pupils, irrespective of age, disability, gender reassignment, race, religion or belief, sex or sexual orientation.
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	<p>theory. Similarly, all experimental work has to be peer reviewed by others before it is accepted.</p> <p>Individual liberty: Students have opportunities that will allow them to use their knowledge and understanding to pose scientific questions and define scientific problems. Students are introduced to the idea that Science cannot provide the answers to some questions, for example, where beliefs, opinions and ethics are important.</p>		
<p>Extra-Curricular and Co-Curricular Opportunities</p>	<p>Links with other subjects in the curriculum</p>		
<p>Lego league</p> <p>Rotary tech challenge</p> <p>Arkwright scholarship</p> <p>Nancy Rothwell award competition</p> <p>Science week activities and poster competition.</p> <p>Kerboodle – additional resources and textbooks</p> <p>Educake</p>	<p>Maths - classifying, counting, measuring, calculating, estimating, tables, graphs, statistics, algebra</p> <p>Geography – Combustion, pollutants, environmental impacts, clean drinking water, product life cycles, climate change.</p> <p>History – structure of the atom, periodic table.</p> <p>Design and technology –properties of metals and metal alloys.</p> <p>Personal development – social and cultural contributions of scientists such as Haber.</p> <p>English and MFL: etymology of words</p>		

Physics Knowledge Sequencing

By the end of key stage FOUR we want all students of Physics to know and do the following key things Hold Confident knowledge & understanding of key terms and concepts in Physics; apply to scenarios; make competent description; hold thorough practical skills; analyse qualitative & quantitative data with reasoning; manipulate of data; draw coherent conclusions; make well-reasoned judgements; evaluate practical procedure with growing independence, link key concepts

Prior Knowledge In KS4, students of Physics will build on the following prior learning: KS3 knowledge and understanding, ability to think scientifically, appreciation of key practical methods; awareness of variables; KS3 mathematical skills, awareness of the purpose of evaluation; justified conclusion; analysis of data with description of trends; key apparatus and techniques; appreciation of lab safety and safe use of experimental equipment

Future Knowledge The Curriculum in KS4 Physics will prepare students for the following future learning: Confident knowledge & GCSE understanding; application to wider scenarios, such as energy and energy resources; particles at work, forces in action, waves, electromagnetism and space; manipulation of data; coherent conclusions; well-reasoned judgements; evaluate & refine practical procedure independently, link key concepts.

	Term	Key Knowledge	Assessment Focus
Year 10	1	Describe density as a property of a material and not a particular object. Calculate the volume of some regular shapes and the density of materials, with support. Outline the behaviour of particles in solids, liquids, and gases. Describe pressure as being caused by collisions of gas particles with the walls of its container. State that the temperature of a gas is related to the kinetic energy of the gas particles.	End of topic assessment on molecules and matter Methods of practically measuring density core practical
	2	Name the three types of nuclear radiation the three sub-atomic particles found in an atom (proton, neutron, and electron) and identify some sources of background radiation. Identify the Rutherford (nuclear) model of an atom. Identify the type of decay taking place from a nuclear equation. State that all three types of nuclear radiation are ionising. Define half-life in simple terms such as 'the time it takes for half of the material to decay'	Properties of radiation Radioactivity end of topic assessment
	3	Recognise contact and non-contact forces. Recognise vector and scalar quantities. What a resultant force is and how to calculate it. Explain examples of levers in everyday life. What "the principle of moments" is and how to calculate if moments are balanced. State that gear systems can be used to increase or decrease the size of forces.	Forces in balance end of topic assessment Resultant force calculation
	4	State that the gradient of a distance-time graph represents the speed. Estimate typical speeds for walking, running, and cycling. Describe the difference between speed and velocity using an appropriate example. Measure the acceleration of an object as it moves down a ramp. Identify changes in speed on a distance-time graph using change in gradient.	Motion end of topic assessment Year 10 assessment
	5	State the factors that will affect the acceleration of an object acted on by a resultant force. Calculate the force required to cause a specified acceleration on a given mass. Investigate a factor that affects the acceleration of a mass. State the difference between the mass of an object and its weight. State factors which affect the stopping distance of a car. State Hooke's law.	Hooke's law practical data analysis Forces and motion end of topic assessment
	6	State the factors that affect the pressure acting on a surface. Calculate the pressure caused by an object resting on a surface, given the force and area of contact. State that pressure can be caused by the action of fluids (liquids and gases) on a surface. Describe the cause of atmospheric pressure in simple terms.	Forces and pressure end of topic assessment

Year 11	Term	Key Knowledge			
	1	State examples of both transverse and longitudinal waves. Describe the range of human hearing. Explain the similarities and differences between sound waves and ultrasound waves. Describe practical applications for ultrasound waves. State advantages and disadvantages of using ultrasound waves for diagnosis. Describe that P-waves and S-waves are types of seismic wave.	Planning practical to measure the wavelength of a wave Wave properties end of topic assessment		
	2	Describe that electromagnetic waves transfer energy from one place to an absorber of that energy. State the seven types of electromagnetic wave, in the correct order from longest to shortest wavelength. Explain that the only part of the electromagnetic spectrum that our eyes can detect is visible light. Describe transparent and translucent. Describe situations where real images and virtual images are produced.	Year 11 mock assessment Required practical on absorption and emission of infrared Electromagnetic spectrum and light assessment		
	3	Use the 'right hand thumb rule' to draw the magnetic field pattern of a wire carrying an electric current. Draw the magnetic field pattern for a straight wire carrying a current and for a solenoid. Interpret graphs of potential difference generated in the coil against time. Explain the function and operation of the a.c. and d.c. generators. Draw the magnetic field pattern of a bar magnet and describe how to plot the magnetic field pattern using a compass.	Electromagnetism assessment		
	4	Draw and explain using a diagram the forces acting on a satellite in orbit around the Earth. Describe that there is still much about the universe that is not understood, for example dark mass and dark energy. Describe the name of the element that makes up most of the mass of a star and how these are formed during the stars life cycle.	Space assessment		
	5	Consolidation of prior learning and application to exam questions in preparation for external exams through use of past paper questions.	External examinations		
	6				
Opportunities for developing literacy skills and developing learner confidence and enjoyment in reading		Links to British Values	Links to Careers	Links to Other Personal Development	
FROM THE LIBRARY <i>Solids Liquids and Gasses-530.4</i> <i>Dictionary Of Physics-530.03</i>		Mutual respect: Debates about ethical and moral issues, such as how we should generate electricity in the future, the big bang	Links to a broad range of careers are made at the start of each new topic area. They are given to students on their learning objectives sheets and projected on the	<ul style="list-style-type: none"> • Developing a healthy lifestyle. • Developing healthy relationships. • Develop a set of positive personal traits, 	

<p><i>Changing Materials-530.4</i></p> <p><i>Complete Physics-530</i></p> <p><i>Radiation-539</i></p> <p><i>Nuclear Energy-620</i></p> <p><i>Elements of Nuclear Physics-539.1</i></p> <p><i>Introduction to Atomic and Nuclear Physics-539</i></p> <p><i>Big Idea: Einstein and Relativity-509</i></p> <p><i>Fatal Forces-500</i></p> <p><i>Forces and Motion-531</i></p> <p><i>Forces and Movement-531</i></p> <p><i>Designs in Science:Movement-530</i></p>	<p>Rule of law: When conducting practical work, we have to follow rules about Health and Safety to ensure the safety of everyone in the laboratory. When using radioactive sources, certain members of the department are trained as Radiation Protection Supervisors to comply with Health and Safety laws.</p> <p>Tolerance: Throughout the Science curriculum, scientists from different backgrounds will be discussed, including the challenges they faced because of their beliefs, viewpoints and protected characteristics. When discussing contentious issues, for example theories about the formation of the Universe, all viewpoints are considered while teaching the scientifically accepted ideas. Debates about ethical and moral issues, such as whether we should test drugs on animals, or whether nuclear bombs should be developed. All students are able to share their viewpoints.</p>	<p>introductory slide of each new topic.</p>	<p>dispositions and virtues that informs their motivation and guides their conduct so that they reflect wisely, learn eagerly, behave with integrity and cooperate consistently well with others.</p> <ul style="list-style-type: none"> • Develop confidence, resilience and knowledge so that they can keep themselves mentally healthy. • An inclusive environment that meets the needs of all pupils, irrespective of age, disability, gender reassignment, race, religion or belief, sex or sexual orientation.
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	<p>Democracy: Science is a democratic discipline. When developing new theories, it has to be accepted by a wide number of scientists before it is considered a scientific theory. Similarly, all experimental work has to be peer reviewed by others before it is accepted.</p> <p>Individual liberty: Students have opportunities that will allow them to use their knowledge and understanding to pose scientific questions and define scientific problems. Students are introduced to the idea that Science cannot provide the answers to some questions, for example, where beliefs, opinions and ethics are important.</p>		
<p>Extra-Curricular and Co-Curricular Opportunities</p>	<p>Links with other subjects in the curriculum</p>		
<p>Lego league</p> <p>Rotary tech challenge</p> <p>Arkwright scholarship</p> <p>Nancy Rothwell award competition</p>	<p>Maths - classifying, counting, measuring, calculating, estimating, tables, graphs, statistics, algebra</p> <p>Geography – Seismic waves.</p> <p>History – structure of the atom.</p> <p>Design and technology – .</p>		

<p>Science week activities and poster competition.</p> <p>Kerboodle – additional resources and textbooks</p> <p>Educake</p>	<p>Personal development – social and cultural contributions of scientists such ???????.</p> <p>English and MFL: etymology of words</p>
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