



Putteridge
High
School

Extended Learning Science - Biology Years 9, 10 & 11



Science - Biology

Year 9 - Autumn Term



Extended Learning Opportunities

Subject: Science Biology

Year: 9

Term: 1

Topic: CB1 Cells biology, Microscopes and magnification

Learning Objectives

- Compare the structures inside animal, plant and bacterial cells
- Describe the functions of different cell parts
- Describe how to use a microscope
- Carry out magnification calculations
- Compare the use of light and electron microscopes
- Explain how cells are specialised to have particular roles in a plant or animal

Extended Learning Opportunities

- BBC Bitesize- Key concepts in biology CELLS
<https://www.bbc.com/education/topics/zy9ww6f>
- Log in to the school Focus Educational Software site to access an interactive simulation of the core practical for this topic **SB1b Looking at cells** (Log in through Moodle <https://moodle.putteridgehigh.org/course/view.php?id=467>)
- Make model cells with STEM learning
<https://www.stem.org.uk/resources/elibrary/resource/33215/model-cells>
- Nuffield foundation practical biology <http://www.nuffieldfoundation.org/practical-biology/cells-systems> (see your teacher if you need to use special equipment)
- Visit the human biology section in the blue zone of the natural history museum in London
<http://www.nhm.ac.uk/visit/galleries-and-museum-map/human-biology.html>
- John Innes Centre Electron microscopy https://www.jic.ac.uk/microscopy/intro_EM.html



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Science - Biology

Year 9 - Spring Term



Extended Learning Opportunities

Subject: Combined science Biology

Year: 9

Term: 2

Topic: CB2 Cells, growth and control

Learning Objectives

- Interpret height and mass growth charts using percentiles
- Describe the stages of mitosis (Interphase, Prophase, Metaphase, Anaphase, Telophase, Cytokinesis)
- Describe the uses of stem cells and explain why they behave the way they do
- Describe the structures that a nerve impulse travels through from stimulus to response

Extended Learning Opportunities

- BBC Bitesize- Cells and control
<https://www.bbc.com/education/topics/zpg997h>
 - If your parents have the records from you or your siblings growth chart (red folder) book you could see what percentile line you followed
 - Make an mnemonic to remember the stages of mitosis in order
 - Make a model of mitosis (e.g. paper plates mitosis model) Google mitosis models
 - Assessing skin sensitivity- touch discrimination
<http://www.nuffieldfoundation.org/practical-biology/assessing-skin-sensitivity-%E2%80%93-touch-discrimination>
- Stem cells <https://www.abpischools.org.uk/topic/stem-cells>



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Science - Biology

Year 9 - Summer Term



Extended Learning Opportunities

Subject: Combined science Biology

Year: 9

Term: 3

Topic: CB3 Genetics

Learning Objectives

- Describe the structure of DNA and the method for DNA extraction
- Describe the process of meiosis
- Understand the genetics terminology gene, allele, homozygous, heterozygous, dominant, recessive, genotype, phenotype
- Interpret genetic diagrams like pedigree charts and punnet squares to understand the inheritance of dominant and recessive phenotypes
- Create punnet squares to predict inheritance
- Explain how the gender of a person is determined by XX and XY chromosomes
- Describe and explain the impacts of genetic mutations
- Explain the benefits of the human genome project

Extended Learning Opportunities

- BBC Bitesize- Genetics <https://www.bbc.com/education/topics/zxyggdm>
- Create flashcards with keywords and definitions
- Extract your own DNA <https://www.youtube.com/watch?v=DaaRrR-ZHP4>
- Modelling the structure of DNA sweetie model (See page 70)
http://downloads.bbc.co.uk/schools/teachers/bang/bang_tp_dnareplication.pdf
- Find out more about the human genome project
<http://whoami.sciencemuseum.org.uk/whoami/findoutmore/yourgenes/whatwasthehumangenomeproject>



Science - Biology

Year 10 – Extended learning opportunities

Autumn Term



Extended Learning Opportunities

Subject: Combined science Biology

Year: 10

Term: 1

Topic: Evolution and genetic modification

Learning Objectives

- Explain the evidence for human evolution including fossils of hominid skeletons and stone tools.
- Describe how we classify living things into the five kingdoms and why this changed to the 3 domains.
- Describe the process of natural selection
- Compare natural selection and selective breeding
- Evaluate the benefits and risks of selective breeding and genetic engineering
- Explain how we can create genetically modified organisms (GMO's)

Extended Learning Opportunities

- BBC Bitesize- Natural selection and genetic modification
<https://www.bbc.com/education/topics/zsb44qt>
- Embark on a seven-million-year journey of evolution and see fossil and artefact discoveries in the Human Evolution gallery at the natural history museum in London.
<http://www.nhm.ac.uk/discover/the-origin-of-our-species.html>
- Read the life of Charles Darwin <http://www.bbc.co.uk/timelines/zq8gcdn>
- Natural selection simulation lab <https://phet.colorado.edu/en/simulation/legacy/natural-selection>
- Read the inspirational story of Carl Woese pioneer of the 3 domains classification system
<http://www.pbs.org/wgbh/nova/next/evolution/carl-woese/>
- Modelling genetic engineering <https://www.youtube.com/watch?v=nfC689EIUVk>
- Frequently asked questions on genetically modified foods
http://www.who.int/foodsafety/areas_work/food-technology/faq-genetically-modified-food/en/



Science - Biology

Year 10 – Spring Term



Extended Learning Opportunities

Subject: Combined science Biology

Year: 10

Term: 2

Topic: Health and disease

Learning Objectives

- Explain the difference between communicable and non-communicable diseases
- Give examples of communicable diseases caused by bacteria, viruses, fungi and protozoa
- Explain how communicable diseases are transmitted (spread) and prevented e.g. cholera, HIV, malaria, chlamydia, TB, ebola
- Interpret data on the risk factors of communicable diseases like cardiovascular disease, cirrhosis of the liver and malnutrition.
- Describe how enzymes work in the body and the effect of pH and temperature on enzyme activity.
- Describe the physical and chemical barriers to disease.
- Explain how the immune system defends against disease using white blood cells and antigens.
- Explain how vaccinations and exposure to a pathogen can cause immunity using ideas about memory cells
- Describe the stages of medicinal drug testing including preclinical and clinical trials and explain the purpose of each stage

Extended Learning Opportunities

- BBC Bitesize- Health, disease and medicine
<https://www.bbc.com/education/topics/z8xppbk>
- Log in to the school Focus Educational Software site to access an interactive simulation of the core practical for this topic **SB1h Effect of pH on enzymes** (Log in details from your science teacher)
- Learn about the interesting ideas of Ignaz Semmelweis (Hospital hygiene), Edward Jenner (Vaccinations) and John Snow (Cholera), Alexander Flemming (Antibiotics)
- Learn more about heart health including risk factors at the British Heart Foundation
<https://www.bhf.org.uk/>
- Research communicable disease
<https://www.abpishools.org.uk/topic/diseases>



<https://www.abpischools.org.uk/topic/infectiousdiseases-pathogens>

<https://www.abpischools.org.uk/topic/infectiousdiseases-medicines/1/1>

- HIGHER LEVEL Immune system game

<https://www.nobelprize.org/educational/medicine/immunity/game/index.html>



Science - Biology

Year 10 – Summer Term



Extended Learning Opportunities

Subject: Combined science Biology

Year: 10

Term: 3

Topic: CB6 Plant structures, transpiration and photosynthesis

Learning Objectives

- Recall the chemical word equation and symbol equation of photosynthesis
- Describe and explain the adaptations of leaves for photosynthesis including stomata and guard cells, spongy mesophyll, palisade cells and xylem
- Explain how water and mineral ions are transported in the plant from roots to the leaves by transpiration
- Explain how sugar is transported in the plant from leaf to roots in phloem by translocation
- Describe how substances are transported across cell membranes by diffusion, osmosis and active transport
- Describe the core practical method for investigating the effect of light intensity on the rate of photosynthesis
- Describe a method to investigate the rate of transpiration using a photometer
- Describe and explain graphs of rates of photosynthesis against light intensity, temperature and carbon dioxide concentration including the idea of limiting factors

Extended Learning Opportunities

- BBC Bitesize- Plant structures and their functions
<https://www.bbc.com/education/topics/zcqxxfr>
- Log in to the school Focus Educational Software site to access an interactive simulation of the core practicals for this topic **SB1i Osmosis in potato chips, SB6b Photosynthesis** (Log in through Moodle <https://moodle.putteridgehigh.org/course/view.php?id=467>)
- Virtual lab rate of transpiration investigation
http://www.mhhe.com/biosci/genbio/virtual_labs_2K8/labs/BL_12/index.html
- The mysterious evolution of stomata video and questions
<http://www.saps.org.uk/secondary/teaching-resources/1418-interviews-with-scientists-the-mystery-of-the-evolution-of-stomata>
- Measuring stomatal density with nail varnish <http://www.saps.org.uk/secondary/teaching-resources/299-measuring-stomatal-density>
- Careers in plant biology <http://www.saps.org.uk/secondary/themes/849-careers-in-science>



Science - Biology

Year 11 – Extended learning opportunities

Autumn Term



Extended Learning Opportunities

Subject: Combined science Biology

Year: 11

Term: 1

Topic: CB7 Animal coordination, control and homeostasis

Learning Objectives

- Recall the names of the main hormones (adrenaline, thyroxine, Oestrogen, Progesterone, LH, FSH, insulins, glucagon) in the human body, which glands produce them and their effects on the body including target organs
- Describe how hormones control metabolic rate
- Describe the causes, effects and treatment of
 - Type 1 diabetes
 - Type 2 diabetes
- Describe the role of hormones in menstrual cycle
- Evaluate the use of barrier and hormonal contraceptives
- Explain how hormones are used in IVF fertility treatment

Extended Learning Opportunities

- BBC Bitesize- Animal coordination, control and homeostasis
<https://www.bbc.com/education/topics/z38qghv>
- Hormones <https://www.abpschools.org.uk/topic/hormones/1/1>
- Diabetes and the body animation <https://www.youtube.com/watch?v=X9ivR4y03DE>
- Diabetes information <https://www.nhs.uk/conditions/diabetes/>
- Diabetes UK, Know diabetes. Fight diabetes <https://www.diabetes.org.uk/>
- Contraception <https://www.bupa.co.uk/health-information/directory/c/methods-of-contraception>
- Hormones to treat infertility <https://www.youtube.com/watch?v=4CxNeiAICmc>



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Science - Biology

Year 11 – Spring Term



Extended Learning Opportunities

Subject: Combined science biology

Year: 11

Term: 2

Topic: CB8 Exchange and transport in animals

Learning Objectives

- Describe the structure of the lungs and explain how they are adapted to efficient gas exchange.
- Compare inhaled and exhaled air
- Describe the structure of the heart and how it is adapted to pump blood around the body.
- Describe the circulatory system including aorta, vena cava, pulmonary artery, pulmonary vein
- Compare the structure of arteries, veins and capillaries and explain the differences
- Compare the processes of aerobic and anaerobic respiration
- Describe the core practical method for measuring respiration using a respirometer

Extended Learning Opportunities

- BBC Bitesize <https://www.bbc.com/education/topics/zsrkk2p>
- Log in to the school Focus Educational Software site to access an interactive simulation of the core practical for this topic **SB8e Respiration rates** (Log in through Moodle <https://moodle.putteridgehigh.org/course/view.php?id=467>)
- Investigate the human circulatory system <https://www.abpischools.org.uk/topic/heartandcirculation/>
- Heart dissection video (you can buy hearts from the supermarket to do your own dissection, ADULT SUPERVISION REQUIRED) https://www.youtube.com/watch?v=yE3Y-XR8Ax4&has_verified=1



Science - Biology

Year 11 – Summer Term



Extended Learning Opportunities

Subject: Combined science Biology

Year: 11

Term: 3

Topic: CB9 Ecosystems and material cycles

Learning Objectives

- Recall examples of biotic and abiotic factors in an ecosystem
- Describe examples of biotic relationships including parasitism, mutualism, predator-prey cycles and competition
- Explain the importance of biodiversity and how human activities are leading to a decline in biodiversity including fertilisers and eutrophication, fish farming and foreign species introduction
- Describe the core practical method for investigating the effect of light intensity on plant distribution using a transect and quadrat
- Describe how carbon moves around the environment in the carbon cycle and explain how human activity is affecting the amount of carbon dioxide in the atmosphere
- Describe how nitrogen moves around the environment in the nitrogen cycle
- Explain the role of bacteria in the carbon and nitrogen cycles
- Describe the water cycle and how desalination can be used to provide drinking water

Extended Learning Opportunities

- BBC Bitesize Ecosystems and material cycles
<https://www.bbc.com/education/topics/ztvrrwx>
- Log in to the school Focus Educational Software site to access an interactive simulation of the core practical for this topic **SB9c Field work** (Log in through Moodle
<https://moodle.putteridgehigh.org/course/view.php?id=467>)
- Make a model of one of the cycles in this topic