

GCSE Biology (Separate Science) 15 Week Revision Timetable

Exam advice

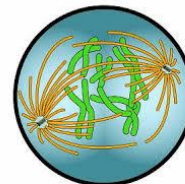
- READ THE **WHOLE** QUESTION CAREFULLY before starting to write your answer
- Make sure you have all the necessary equipment
- It's ok to draw diagrams even if there are lines for writing. Don't forget to label them.
- Underlining key words in the question may help to focus your mind
- Show all your workings in the space provided for each question
- Don't alter your working – cross it out and replace it
- Don't give the markers a choice of answers or methods
- Before rounding, show more figures than the question asks for
- Make a rough estimate of calculations. When estimating work to 1sf.
- Whenever possible, ask yourself “is my answer sensible?”
- Check your answers, especially if you have used a calculator!
- Don't rush but use time carefully
- Use the mark allocation to inform your answers
- Check the units given in the question and in your answer
- Remember to use the appropriate number of decimal places or significant figures.

When revising...

- **don't leave your revision until the night before the examination**
- create a revision timetable and stick to it
- study in a place where you can concentrate
- do lots of questions, especially past examination questions
- start revising by topics and nearer the examination mix up the questions
- focus on your weaker topics but revise others as well
- learn formula and facts off by heart, consider writing prompt sheets
- know which topics are covered on paper 1 and which are on paper 2.
- revise REQUIRED PRACTICALS very carefully
- consider using a revision workbook
- use online revision websites especially You Tube as there are lots of suitable GCSE tutorials there..

Some useful websites.....

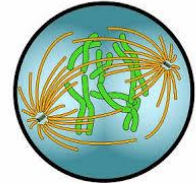
- <https://www.qcsepod.com/>
- <http://app.gojimo.co/product/945a58eb-bc96-4242-89e8-2fa555978fa8>
- <https://www.aqa.org.uk/subjects/science/gcse/biology-8461/assessment-resources>
- <https://www.bbc.com/bitesize/examspecs/zpgcbk7>



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Here is a summary of the topics to be covered in this revision timetable

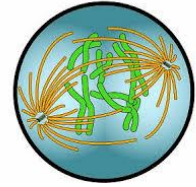
Weeks before the exam	Topic
15.	Paper 1 Topic: Cell structure and cell division
14.	Paper 1 Topic: Transport in cells
13.	Paper 1 Topic: Tissues, Organs and Organ Systems
12.	Paper 1 Topic: Health and Disease
11.	Paper 1 Topic: Enzymes and Digestion
10.	Paper 1 Topic: Infection and Response
9.	Paper 1 Topic: Bioenergetics
8.	Paper 2 Topic: The Nervous System
7.	Paper 2 Topic: The Endocrine System
6.	Paper 2 Topic: Animal and Plant Hormones
5.	Paper 2 Topic: DNA and Reproduction
4.	Paper 2 Topic: Genetics
3.	Paper 2 Topic: Evolution and Classification
2.	Paper 2 Topic: Organisms and Their Environment + Human Impacts
1.	Paper 2 Topic: Biomass, Food and Biotechnology
DON'T FORGET TO REVISE	REQUIRED PRACTICALS (Both in Paper 1 and Paper 2)



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Week 15	😊	😐	😞
Cell Structure and Cell Division			
Name the main organelles of plant and animal cells (eukaryotic cells)			
Recall the relative size of bacterial cells (prokaryotic cells)			
Describe the difference in how the genetic material is found within eukaryotic and prokaryotic cells.			
Explain how the main sub-cellular structures, including the nucleus, cell membranes, mitochondria, cell wall and chloroplasts in plant cells and plasmids in bacterial cells are related to their functions			
Explain how the structure of different types of cell relate to their function in a tissue, an organ or organ system, or the whole organism. Including sperm cells, nerve cells and muscle cells in animals and root hair cells, xylem and phloem cells in plants.			
Describe cell differentiation			
Describe the differences in magnification and resolution between electron and light microscopes			
Define binary fission			
Explain how to prepare an uncontaminated culture			
Genetics			
Recall that the nucleus of a cell contains chromosomes made of DNA molecules. Each chromosome carries a large number of genes. In body cells the chromosomes are normally found in pairs			
Give an overview of mitosis			
Understand that Cell division by mitosis is important in the growth and development of multicellular organisms			
Recognise and describe situations where mitosis is occurring.			
Define a stem cell			
Recall that stem cells from human embryos and adult bone marrow can be cloned and made to differentiate into many different types of human cells			
Name some conditions which may be helped by treatment with stem cells			
Discuss the ethical or religious objections and potential risk of stem cell use			
Recall that stem cells from meristems in plants can be used to produce clones of plants quickly and economically and describe possible uses			

Week 14			
Transport in cells			
Explain how substances may move into and out of cells across the cell membranes via diffusion			
Describe diffusion			
Recall that some of the substances transported in and out of cells by diffusion are oxygen and carbon dioxide in gas exchange, and of the waste product urea from cells into the blood plasma for excretion in the kidney			
Describe factors that affect the rate of diffusion			
Recall that a single-celled organism has a relatively large surface area to volume ratio to allow sufficient transport of molecules into and out of the cell			

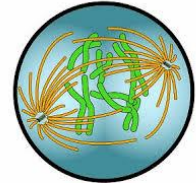


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Explain how the small intestine and lungs in mammals, gills in fish, and the roots and leaves in plants, are adapted for exchanging materials			
List factors that increase the effectiveness of an exchange surface			
Describe osmosis			
Recall that active transport moves substances from a more dilute solution to a more concentrated solution (against a concentration gradient). This requires energy from respiration.			
Link the structure of a root hair cell to its function.			
Describe a use for active transport in both plants and animals.			
Explain the difference between diffusion, osmosis and active transport			

Week 13	😊	😐	😞
Tissues, Organs and Organ Systems			
Explain organisational hierarchy			
Define a cell, tissue, organ and organism			
Recall the structure and functioning of the human heart and lungs, including how lungs are adapted for gaseous exchange.			
Recall that the heart is an organ that blood around the body in a double circulatory system. The right ventricle pumps blood to the lungs where gas exchange takes place. The left ventricle pumps blood around the rest of the body.			
Name the major blood vessels			
Describe the structure of the lungs			
Explain natural and artificial pacemakers			
Name the three different types of blood vessel and explain how the structure of these vessels relates to their functions.			
Describe the components of blood and how they are adapted to function			
Know the function of epidermal tissues palisade mesophyll, spongy mesophyll, xylem and phloem and meristem tissue			
Describe the structures of tissues in the leaf and relate to their functions			
Explain how root hair cells are adapted for the efficient uptake of water and mineral ions			
Know the structure and function of xylem tissue.			
Define factors which affect the rate of transpiration			
Explain the role of stomata and guard cells			
Explain the role of phloem tissue and name this process			

Week 12			
Health and Disease			
Describe coronary heart disease: a non-communicable disease			
State that health is the state of physical and mental wellbeing.			
Know that defects in the immune system mean that an individual is more likely to suffer from infectious diseases.			
Recall that immune reactions initially caused by a pathogen can trigger allergies such as skin rashes and asthma.			

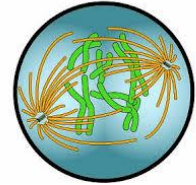


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Know that severe physical ill health can lead to depression and other mental illness.			
Explain the effect of lifestyle on some non-communicable diseases and that they can be caused by and their increased by the interaction of a number of factors,			
Recall that benign tumours and malignant tumours result from uncontrolled cell division. Malignant tumour cells are cancers.			
Know lifestyle risk factors for various types of cancer including smoking, obesity, common viruses and UV exposure. There are also genetic risk factors for some cancers.			

Week 11			
Enzymes and Digestion			
Know that digestive system is an example of an organ system in which several organs work together to digest and absorb food.			
Relate knowledge of enzymes to Metabolism			
Describe the structure function and optimum conditions for enzymes			
Define denaturation			
Recall the sites of production and the action of amylase, proteases and lipases.			
Know that digestive enzymes convert food into small soluble molecules that can be absorbed into the bloodstream.			
State that the products of digestion are used to build new carbohydrates, lipids and proteins. Some glucose is used in respiration.			
Recall where bile is made and stored and its pH and function			
State conditions that increase the rate of fat breakdown by lipase.			

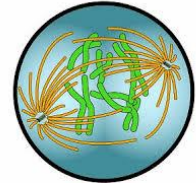
Week 10	😊	😐	😞
Infection and Response			
Explain how diseases caused by viruses, bacteria, protists and fungi are spread in animals and plants.			
Define the term pathogen			
Explain how bacteria and viruses may reproduce in the body and why they make you feel ill			
Give examples of how the spread of diseases can be reduced			
Know that Measles is a viral disease and describe the symptoms			
Explain the effects of HIV and how it is transmitted			
Describe tobacco mosaic virus (TMV)			
Know that Salmonella food poisoning is spread by bacteria ingested in food, or on food prepared in unhygienic conditions.			
Describe the symptoms of salmonella food poisoning			
Know how Gonorrhoea is a transmitted and how its spread can be reduced.			
State the cause of Gonorrhoea and describe the symptoms and how it is treated			
Describe rose black spot and state its cause			
Know how rose black spot is spread in the environment and how it can be treated			



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Describe malaria and state its cause			
Know how malaria is spread and how to reduce the spread of the disease			
Define some of body's natural defences to infection			
Explain the role of white blood cells			
Describe the process of vaccination			
Explain "herd immunity"			
State what antibiotics can treat and explain the development of antibiotic resistance bacteria			
Define painkillers			
Explain why it is difficult to develop drugs that kill viruses			
Know that traditionally drugs were extracted from plants and microorganisms and give some common examples including who discovered Penicillin and from what			
State that most new drugs are synthesised by chemists in the pharmaceutical industry. However, the starting point may still be a chemical extracted from a plant.			
For new medicinal drugs explain the stages in preclinical and clinical trial			
Define placebo			
Explain double blind trials			
Monoclonal antibodies			
Explain how they are produced			
Name uses of monoclonal antibodies both diagnostic and therapeutic			
Plant disease			
Know how plant disease is detected and identified			
Plants can be infected by a range of viral, bacterial and fungal pathogens as well as by insects.			
Plants can be damaged by a range of ion deficiency conditions:			
Explain plant physical defence responses			
Explain chemical plant defence responses			
Explain plant mechanical defence adaptations.			

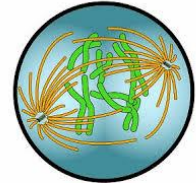
Week 9	😊	😐	😞
Bioenergetics			
State the word equation for photosynthesis			
Write a balanced symbol equation for photosynthesis (HT Only)			
Explain where the energy for photosynthesis comes from			
State the factors that affect the rate of photosynthesis			
Explain limiting factors (HT only)			
Explain graphs of photosynthesis rate involving two or three factors and decide which is the limiting factor (HT only)			



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Understand and use inverse proportion – the inverse square law and light intensity in the context of photosynthesis. (HT only)			
Explain how limiting factors are important in the economics of enhancing the conditions in greenhouses to gain the maximum rate of photosynthesis while still maintaining profit (HT only)			
State the six uses of glucose by plants			
Know how plant use nitrate ions that are absorbed from the soil.			
Compare the processes of aerobic and anaerobic respiration with regard to the need for oxygen, the differing products and the relative amounts of energy transferred.			
Define aerobic and anaerobic respiration			
State that reactions which transfer energy to the environment are exothermic reactions			
Name three things organisms need energy for			
State the word equation for aerobic respiration			
Write a balanced symbol equation for aerobic respiration (HT only)			
State the word equation for anaerobic respiration in muscles			
The energy transferred supplies all the energy needed for living processes.			
State the word equation for anaerobic respiration in plant and yeast cells			
Write a balanced symbol equation for anaerobic respiration in yeast and plant cells (HT only)			
State that anaerobic respiration in yeast cells is called fermentation and has economic importance in the manufacture of bread and alcoholic drinks			
Explain why anaerobic respiration takes place in muscles during exercise			
Explain muscle fatigue and oxygen debt			
Define the role of the liver in the removal of lactic acid (HT only)			
Define metabolism			
The energy transferred by respiration in cells is used by the organism for the continual enzyme controlled processes of metabolism that synthesise new molecules.			
State five metabolic processes			

Week 8	😊	😐	😞
The Nervous System			
Define homeostasis			

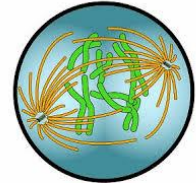


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Name three levels maintained by homeostasis			
State that automatic control systems may involve nervous responses or chemical responses			
Define receptors, coordination centres and effectors			
Explain how the structure of the nervous system is adapted to its functions			
State the main function of the nervous system			
Describe how information from receptors is carried to the brain to coordinate the response			
Describe the roles of sensory neurones, relay neurones, motor neurones, synapses and effectors in a reflex action, and state that reflex actions are automatic and rapid			
Identify the cerebral cortex, cerebellum is concerned and medulla on a diagram of the brain			
Describe the function of the cerebral cortex, cerebellum is concerned and medulla			
Describe how neuroscientists have been able to map the regions of the brain to particular functions. (HT only)			
Relate the structures of the eye to their functions, including accommodation to focus on near or distant objects and adaptation to dim light.			
Explain the function of the retina, the optic nerve, the sclera, the iris and the ciliary muscles			
Describe myopia and hyperopia and how they are treated with spectacle lenses			
Describe how new technologies are used to treat eye defects			
Interpret ray diagrams demonstrating how spectacle lenses correct myopia and hyperopia.			
Explain mechanisms to lower or raise body temperature in a given context. (HT only)			

Week 7

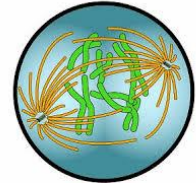
Week 7			
The Endocrine System			
Define hormones and their rate of effect			
Describe the functions and main organs of the endocrine system			
Describe the function of the pituitary gland			
Identify the position of the pituitary gland, pancreas, thyroid, adrenal gland, ovaries and testes on a diagram of the human body			
Explain the role of the pancreas and insulin in the control of blood glucose concentration			
Compare Type 1 and Type 2 diabetes and explain how they can be treated			
Recall that if the blood glucose concentration is too low, the pancreas produces glucagon that causes glycogen to be converted into glucose and released into the blood. (HT only)			
Explain how glucagon interacts with insulin to control blood glucose (sugar) levels in the body (HT only)			
Explain how the body maintains water and nitrogen balance in the body			
Recall that excess water, ions and urea are removed via the kidneys in the urine.			
Explain the role of the liver in deaminated to form ammonia and that ammonia is toxic and so it is immediately converted to urea for safe excretion. (HT only)			
The kidneys produce urine by filtration of the blood and selective reabsorption of useful substances such as glucose, some ions and water			
Describe the role of ADH in controlling the water level in the body (HT only)			
Know how people who suffer from kidney failure may be treated.			



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Week 6			
Animal and Plant Hormones			
State that during puberty reproductive hormones cause secondary sex characteristics to develop.			
State that testosterone is the main male reproductive hormone produced by the testes and it stimulates sperm production.			
Explain the interactions of hormones in the control of the menstrual cycle. (HT only)			
Evaluate the different hormonal and non-hormonal methods of contraception.			
Explain the use of hormones to treat infertility (HT only)			
State some problems with fertility treatment			
Explain negative feedback (HT only)			
State two hormones that are controlled by negative feedback and their function (HT only)			
Plant hormones			
Explain how plants use hormones to coordinate and control growth in response to light and gravity			
Describe the role of gibberellins and ethane in plants (HT only)			
Describe some uses of plant hormones in agriculture and horticulture (HT only)			

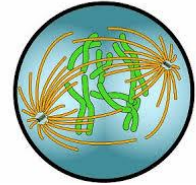
Week 5			😊	😐	😞
DNA and Reproduction					
Describe sexual and asexual reproduction					
Name the sex cells in plants and animals					
Explain meiosis to form gametes					
Recall that gametes join at fertilisation to restore the normal number of chromosomes.					
Explain how cell divide by mitosis.					
List some advantages and disadvantages of sexual reproduction					
List some advantages and disadvantages of asexual reproduction					
Recall that some organisms reproduce by both methods depending on the circumstances.					
Define a gene					
Define the term genome					
Discuss the importance of understanding the human genome					
Recall the four bases and their complimentary pairing					
Explain how the bases code for proteins					
Describe the DNA polymer					
Explain how a change in DNA structure result in a change in the protein synthesised (HT only)					
Explain how proteins are synthesised on ribosomes, according to a template (HT only)					
Recall that when the protein chain is complete it folds up to form a unique shape. Which enables the proteins to do their job as enzymes, hormones or forming structure (HT only)					
Recall that mutations occur continuously and most do not alter the protein . (HT only)					
(HT only) Not all parts of DNA code for proteins. Non-coding parts of DNA can switch genes on and off, so variations in these areas of DNA may affect how genes are expressed.					



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Week 4			
Genetics			
Explain the difference between genotype and phenotype			
Explain dominant and recessive alleles			
Define homozygous and heterozygous.			
Recall that most characteristics are a result of multiple genes interacting.			
Understand family trees			
Use a Punnett square diagram to predict the outcome of a monohybrid cross			
Name an Inherited disorder caused by a dominant allele			
Name an Inherited disorder caused by a recessive allele			
Recall the number of pairs of chromosomes in an ordinary human body			
State the pairs of chromosomes that carries the genes that determine sex.			
Explain single gene inheritance and carry out a genetic cross to show sex inheritance.			

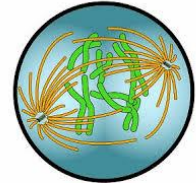
Week 3			
Evolution and Classification			
Describe variation			
Give causes of variation			
Explain how evolution occurs through natural selection			
Describe selective breeding			
Define some chosen characteristics for selective breeding			
Explain the problems with 'inbreeding'			
Describe genetic engineering			
Give examples of uses of genetic engineering			
Define GM crop and give examples			
State some concerns about GM crops			
Recall the possibility of genetic modification to overcome some inherited diseases.			
Explain plant cloning tissue culture and cuttings			
Explain animal cloning by embryo transplants and adult cell cloning			
Explain theory of evolution by natural selection proposed by Charles Darwin			
State reason why the theory of evolution by natural selection was only gradually accepted			
Recall the theory of Jean-Baptiste Lamarck			
Summarise the work of Alfred Russel Wallace into speciation			
State some cause for new species to arise			
Recall some history of the understanding of genetics including: <ul style="list-style-type: none"> • In the mid-19th century Gregor Mendel carried out breeding experiments on plants. 			



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<ul style="list-style-type: none"> In the late 19th century behaviour of chromosomes during cell division was observed. the structure of DNA was determined in the mid-20th century 			
Understand why the importance of Mendel's discovery was not recognised until after his death.			
State evidence for evolution by natural selection			
Define fossils and explain how they are formed			
Explain why there are no fossils of many early forms of life			
Recall that we can learn from fossils how much or how organisms have changed			
List some possible causes of extinction			
Explain the emergence of antibiotic resistant bacteria			
Recall that MRSA is resistant to antibiotics.			
Describe how to reduce the rate of development of antibiotic resistant strains			
Describe the Linnaeus system to classify living things and name the levels.			
State that organisms are named by the binomial system of genus and species.			
Know that new models of classification have been proposed based on improved analysis			
Define the 'three-domain system' developed by Carl Woese.			
Understand that evolutionary trees are a method used by scientists to show how they believe organisms are related.			

Week 2	😊	😐	😞
Organisms and Their Environment + Human Impacts			
Suggest the factors for which organisms are competing in a given habitat			
Suggest how organisms are adapted to the conditions in which they live			
Define an ecosystem			
Define interdependence			
Explain what is meant by a "stable community"			
Explain how a change in an abiotic factor would affect a given community			
List abiotic factors			
Explain how a change in a biotic factor might affect a given community			
List biotic factors			
Explain how organisms are adapted to live in their natural environment			
Define an extremophile			
Define a producer, primary consumers, secondary consumers and tertiary consumers			
Construct food chains			
Explain the use of transects and quadrats			
Explain why, in a stable community, the numbers of predators and prey rise and fall in cycles			
Recall the carbon cycle			
Recall the water cycle			
Explain the role of microorganisms in cycling materials through an ecosystem.			

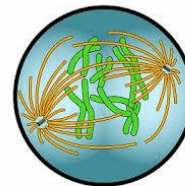


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State factors which affect the rate of decay			
Recall that biogas generators can be used to produce methane gas as a fuel.			
Evaluate the impact of environmental changes on the distribution of species in an ecosystem given appropriate information (HT only)			
State some environmental changes			
Define biodiversity			
State the benefit of ensuring a great biodiversity			
Explain how human activities are reducing biodiversity			
Understand that rapid growth in the human population and an increase in the standard of living mean that increasingly more resources are used and more waste is produced. Unless waste and chemical materials are properly handled, more pollution will be caused			
Explain how pollution can occur on land, in air and in water			
State how humans reduce the amount of land available for other animals			
Explain the destruction of peat bogs			
State why large-scale deforestation in tropical areas has occurred			
List the consequences of deforestation			
Describe global warming			
State the biological consequences of global warming			
Explain how humans are trying to reduce these negative effects			

Week 1

Week 1			
Biomass, Food and Biotechnology			
List the trophic levels			
State the role of decomposers			
Construct a pyramid of biomass			
Explain how the loss of biomass at each trophic level affects the number of organisms at each level.			
Recall that only approximately 10% of the biomass from each trophic level is transferred to the level above it.			
State reason for losses of biomass			
List some factors affecting food security			
Explain 'Factory farming' to restrict energy transfer from food animals to the environment.			
Explain sustainable fishing security			
Understand that modern biotechnology techniques enable large quantities of microorganisms to be cultured in industrially controlled vats for food.			
State that the fungus <i>Fusarium</i> is useful for producing mycoprotein,			
Recall that GM bacterium produces human insulin.			



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Required Practicals

Biology Paper 1

Unit 1 – Cell Biology

Required Practical – Using a microscope

YouTube links: [Using a light microscope](#)

[Preparing a microscope slide \(Onion cell\)](#)

BBC Bitesize links: [Calculating magnification](#)

Collins Practical worksheet: [Method](#)

Required Practical – Investigating the effects of antibiotics and antiseptics

YouTube links: [Creating a spread plate](#)

BBC Bitesize links: [Growing microbes in the lab](#)

Collins Practical worksheet: Method

Required Practical – Osmosis (potato practical)

YouTube links: [Investigating Osmosis](#)

BBC Bitesize links: [Osmosis overview](#)

[Osmosis in cells](#)

Collins Practical worksheet: [Method](#)

Unit 2 – Organisation

Required Practical – Testing for carbohydrates, lipids and proteins

YouTube links: [Food test](#)

BBC Bitesize links: [Food testing](#)

Collins Practical worksheet: [Method](#)

Required Practical – Investigate the effect of pH on Amylase enzyme

YouTube links: [Effect of pH](#)

BBC Bitesize links: [Enzymes](#)

[Effect of pH on enzymes](#)

[Digestive Enzymes](#)

Collins Practical worksheet: [Method](#)

Unit 3 – Infection and response

No required practical investigations for this unit

Unit 4 – Bioenergetics

Required Practical – Investigating effect of light intensity on photosynthesis

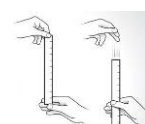
YouTube links: [Light intensity with pond weed](#)

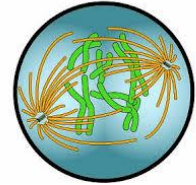
BBC Bitesize links: [Factors effecting photosynthesis](#)

[Light intensity investigation](#)

Collins Practical worksheet: [Method](#)

Biology Paper 2





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Unit 5 – Homeostasis and response

Required Practical – Investigating a factor on the effect of reaction times

YouTube links: [Reaction times](#)

BBC Bitesize links: [Reflexes](#)

Collins Practical worksheet: [Method](#)

Required Practical – Investigate the effect of light or gravity on newly germinated seeds

YouTube links: **(no demonstration of practical)**

BBC Bitesize links: [BBC bitesize video](#)

Collins Practical worksheet: [Method](#)

Unit 6 – Inheritance, variation and evolution

No required practical investigations for this unit

Unit 7 – Ecology

Required Practical – Measure population size using sampling techniques

YouTube links: [Sampling along a transect](#)

BBC Bitesize links: [Sampling overview](#) [Transects and Quadrats](#)

Collins Practical worksheet: [Method](#)



Required Practical – Rate of decay in milk based on pH change

YouTube links: **(no demonstration of practical)**

BBC Bitesize links: [Factors affecting decay](#) [Decay](#)

Collins Practical worksheet: [Method](#)