

INTENT KS3: The intention is to cover the KS3 specification in Years 7 and 8. Almost every detail of the KS3 content recurs in GCSE so this is all useful grounding for further study.

Covering KS3 in Years 7 and 8 will allow us to begin the GCSE course in Year 9 and so have enough teaching time to offer separate science GCSEs.

Key areas of development in year 7 and 8 include: practical skills; the importance of accurate scientific terminology; confidence with recording data and drawing suitable conclusions.

KS3	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
7	<p>Topic: Cells</p> <p>Assessment:</p> <p>Variety of KS3 questions. Vocab test</p> <p>Subject Content:</p> <p>The function of cell components. Comparison of plant and animal cells. Introduction to specialised cells</p> <p>Learner Skills:</p> <p>Resilience learning will be activated as pupils will use essential skills required to operate a microscope. They will collaboratively improve lab skills working together to prepare a slide.</p>	<p>Topic: Reproduction</p> <p>Assessment:</p> <p>Variety of KS3 questions. This time also testing practical skills.</p> <p>Subject Content:</p> <p>Pupils learn about plant sexual reproduction which is not taught at any other KS. Pupils will learn about seed adaptations that help with dispersal. Pupils knowledge will be pushed further when they study human reproduction in more detail compared to KS2.</p> <p>Learner Skills:</p> <p>Creativity will be used to apply knowledge integral to scientific understanding.</p>	<p>Topic: Eating, Drinking and Breathing</p> <p>Assessment:</p> <p>Reported Assessment that has a variety of KS3 questions.</p> <p>Subject Content:</p> <p>Pupils will learn the content of a healthy diet and the consequences to their health. This includes vitamin deficiencies and obesity.</p> <p>Learner Skills:</p> <p>Pupils will demonstrate collaboration as they work together carrying out practical and group work. This will improve their communication techniques.</p>	<p>Topic: Eating, Drinking and Breathing</p> <p>Assessment:</p> <p>Online Educake activities that test factual recall of key scientific facts and vocabulary.</p> <p>Subject Content:</p> <p>Pupils learn about the structure and function of the gas exchange system. Including how humans breathe and the consequences of asthma and smoking.</p> <p>Learner Skills:</p> <p>Pupils will expand their understanding of how to control variables so that practical activities are valid.</p>	<p>Topic: Plants and ecosystems</p> <p>Assessment:</p> <p>Homework assignments will focus on literacy and how to read exam questions. This will help</p> <p>Subject Content:</p> <p>Pupils will explore what happens in photosynthesis and challenge their perception on how producers make food.</p> <p>Learner Skills:</p> <p>Pupils develop their practical skills further by focusing on how to draw graphs and analyse results to draw suitable conclusions.</p>	<p>Topic: Plants and ecosystems</p> <p>Assessment:</p> <p>Formal end of Year exam that tests knowledge learnt throughout the year.</p> <p>Subject Content:</p> <p>Pupils will build on their KS2 knowledge on food chains and food webs so that they understand the interactions of organisms in the environment.</p> <p>Learner Skills:</p> <p>Pupils are encouraged to plan investigations using quadrats, pooters and nets to collect data from a suitable habitat.</p>
	<p>Rationale:</p> <p>A classic foundation topic that builds upon previous knowledge done at KS2. There is a hierarchical demand that enables students to gain confidence and begin to expand their practical skills.</p>	<p>Rationale:</p> <p>This topic builds on prior KS2 knowledge of life cycles and inheritance. This topic bridges the gap nicely to GCSE level where students will learn about sex hormones, the control of the menstrual cycle and contraception.</p>	<p>Rationale:</p> <p>This topic is conveyed in the middle of the Year because it starts to incorporate several themes from the topics studied so far in Year 7. This ensures stretch and challenge to the lessons. This topic also links with nutrition taught in Food Science and enables pupils to gain confidence in understanding enzymes which is further explored in Year 9.</p>	<p>Rationale:</p> <p>This topic continues with the previous term by looking at how lifestyle choices affect human health. Again, this is a topic that builds on KS2 knowledge on tissues, organs and systems. This topic provides pupils confidence when exploring this GCSE topic in Year 9 on non-communicable diseases.</p>	<p>Rationale:</p> <p>This topic follows on from last term and links nicely with the human gas exchange systems. This topic is a great introduction that will be explored more in Year 10, about the human impact in the environment and the carbon cycle. By focusing on literacy and reading skills, this helps prepare students for the end of Year exam in the last term.</p>	<p>Rationale:</p> <p>This topic takes advantage of the improved weather so that pupils can go outside of the classroom and learn about ecosystems. This complements the Field Trip to Kew Gardens in East Grinstead.</p>

KS3	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
8	<p>Topic: Getting the energy your body needs</p> <p>Assessment: Test on Ecology and muscles using a variety of KS3 SATs style questions.</p> <p>Subject Content: Pupils learn the structure and functions of the human skeleton, to include support, protections and movement.</p> <p>Learner Skills: Pupils are encouraged to apply their knowledge by predicting how joints will be affected by diseases and space travel.</p>	<p>Topic: Getting the energy your body needs</p> <p>Assessment: Vocab test on the key words associated with respiration. Educake test to identify weaknesses in factual recall.</p> <p>Subject Content: Pupils learn the difference between aerobic and anaerobic respiration in living organisms. They will explore the importance of respiration to all living organisms. Pupils will also develop a great understanding on how humans can take advantage of anaerobic respiration in the food industry (wine, bread etc)</p> <p>Learner Skills: Pupils will develop their technical vocabulary and gain confidence in using it in structured answers.</p>	<p>Topic: Disease and microbes</p> <p>Assessment: Badger Task – What is the future of antibiotics. This will include class presentations</p> <p>Subject Content: Pupils learn the basic structure of different pathogens – bacteria, fungi and viruses. They will build on their prior knowledge of cells that was done in the previous Year. This will then be stretched by looking into how the immune system works</p> <p>Learner Skills: The class presentations on antibiotics provide an opportunity for pupils to showcase their team work and organisation skills. They will improve their research skills and provide a chance to develop their communication skills.</p>	<p>Topic: Variation for survival</p> <p>Assessment: Test on Variation, DNA and selective breeding using a variety of KS3 SATs style questions.</p> <p>Subject Content: Pupils learn the difference between continuous and discontinuous variation. They will explore the basics of the structure of DNA and how mutations can cause changes in variation.</p> <p>Learner Skills: Pupils will develop their literacy skills. This will be achieved through writing structured answers to ethical questions like: the use of selective breeding; the concerns with cloning; and what complications occur when storing someone’s DNA code/genome.</p>	<p>Topic: Recap of KS3 Topics</p> <p>Assessment: KS3 Exam of at least 1 hour. This exam will include all of the topics studied in biology at KS3.</p> <p>Subject Content: Pupils will use this term to look over all of the topics studied at KS3. This will provide an opportunity for pupils to reflect on what they have learnt during KS3 and help prepare them for the end of Year exam paper.</p> <p>Learner Skills: Pupils will learn how to organise their folders. Pupils have the opportunity to identify their strengths and weaknesses and produce a tailored revision time table. Pupils will identify how they revise best and evaluate the different techniques for revising.</p>	<p>Topic: Animal and Plant Behaviour</p> <p>Assessment: Class project on an independent task about animal or plant behaviour.</p> <p>Subject Content: Pupils will be assigned small groups to explore and present their own project about animal or plant behaviour.</p> <p>Learner Skills: Pupils will develop their team work and communication skills. They will also have an opportunity to improve their research skills and start to evaluate the importance of sources. This topic is in line with the school mission of developing pupils that are curious and resilient.</p>
	<p>Rationale: Skeletal and muscular systems build on aspects of KS2 about vertebrates and invertebrates. The science involved correlates with lots of different careers: sports physiology, occupational therapy, radiography and engineering.</p>	<p>Rationale: Respiration has a lot of misconceptions. It is useful at KS3 to help identify these problems and make sure they do not replicate them at KS4. Respiration is a challenging topic and suitable for this age range at this time.</p>	<p>Rationale: This topic helps extend what they have previously learnt in Year 7 about cells. It provides an opportunity to introduce microbes and immunity that will be explored in more detail in Year 9 during Topic 5 Communicable diseases.</p>	<p>Rationale: Inheritance is studied now as pupils have previously looked at KS2 at life cycles and recognise that living things produce offspring of the same kind, but vary. This will build bridges to later topics at KS4 where pupils will learn in more detail about DNA & mutations.</p>	<p>Rationale: Pupils will learn organisation skills and help develop their revision techniques that will serve them well when they enter the GCSE biology course.</p>	<p>Rationale: This topic on animal and plant behaviour does not come up at all at KS4. This is a great opportunity to explore a topic that students are not familiar with.</p>

INTENT KS4: The intention is to cover (almost all of) the AQA GCSE Combined Science (Trilogy) specification in Years 9 and 10, allowing a genuine GCSE science paper to be set for the Year 10 exam. Our students come with a wide variety of background experience from different feeder schools and we will often need to start with ideas from KS3. As of September 2021, we anticipate that all students will continue with the separate science GCSE Biology course (AKA 'triple award'). If it better suits a year group then it may be that small numbers of students sit combined science in Year 11 (AKA 'double award').

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
9	Topic 1: Cell structure and transport		Topic 3: Organisation and Digestion		Topic 5: Communicable Diseases	
	Topic 2: Cell division		Topic 4: Organising animals and plants		Topic 6: Preventing and treating Diseases	
	Subject Content: In topic 1, pupils will learn about: microscopes, prokaryotic and eukaryotic cells, relative sizes; specialisation in cells; osmosis and active transport. In topic 2, pupils will learn about the cell cycle, mitosis; stem cells and stem cell dilemmas.		Subject Content: In topic 3, pupils will learn about tissues, organs and body systems; chemistry of food; catalysts and enzymes; factors affecting enzymes. In topic 4, pupils will explore the circulatory system. To include the blood, blood vessels, the structure and function of the heart. Then pupils will explore the adaptations of the lungs and the tissues and organs found in plants.		Subject Content: In topic 5, pupils will learn about different types of pathogens and the diseases that they cause. This include plant diseases like black spot. In topic 6, pupils learn about preventing infections by using better hygiene as well as improved medicines like antibiotics and vaccinations. Pupils will also explore how drugs are discovered and how scientists use drug trials to test them.	
	Learner Skills: Improve maths skills by converting units. Example: mm in cm. Pupils also learn about orders of magnitude For literacy, pupils will focus on using the correct terminology to explain what happens to cells that undergo mitosis. Example flaccid and Plasmolysed. They will also improve their communication skills by looking at the pros and cons of using stem cells.		Learner Skills: In literacy, pupils learn the importance of linking adaptations to functions. For example, providing specific adaptations to explain how the villi absorb nutrients. Pupils will also improve their practical skills by performing a variety of practicals with enzymes. The focus here will be to analyse the data. Maths skills will include plotting a line graph from data and drawing a tangent. Pupils will also calculate surface to area ratios.		Learner Skills: Pupils will learn how to write a risk assessment when growing microbe in the lab. They will also improve their mathematical skills in calculating surface areas to observe which antibiotics work best. Analytical skills will be assessed, when pupils look at hygiene data to see how Semmelweis discovered the importance of washing hands. Pupils will improve their communication skills when they have to research a particular disease and present their findings	
	Required practicals: Looking at cells under the microscope. Investigating osmosis in plant cells.		Required practicals: Food tests. Using chemicals to test for proteins, fats, starch and sugars. Investigating the pH on the rate of reaction of amylase.		Required practicals: Investigating the effects of antiseptics and antibiotics	
	Rationale: Pupils have a good grasp on what cells look like, but will now see what they would look like under an electron microscope. At KS3 pupils have learnt the differences between plant and animal cells, but in this topic, they will explore prokaryotic and eukaryotic cells. They will also expand on their knowledge of how molecules are transported by diffusion by looking at the roles of osmosis and active transport.		Rationale: Pupils will expand upon their KS3 knowledge of digestion by learning how enzymes work. This will include more detailed knowledge on how the structure of enzymes is related to their function. Pupils will also improve their KS3 knowledge of breathing by looking at the ventilation of fish and how plants are adapted for transpiration.		Rationale: Pupils expand their KS3 knowledge on the imbalances of diet by learning more about the impact of obesity on their health. They also expand upon their KS3 understanding of bacteria by looking at how microbes cause plant diseases. Pupils will learn in more depth about how the immune system works and how medicines help fight off invading pathogens.	

INTENT KS4: In Year 10, pupils have more lessons compared to Year 9, hence more topics are covered each term. This helps to accelerate the progress through the GCSE biology syllabus so that pupils are better prepared for a mock Paper 1 exam at the end of the Year. This is a great opportunity to highlight pupil progress and address individual concerns.

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
10	Topic 7: Non-communicable Diseases Topic 8: Photosynthesis Topic 9: Respiration		Topic 10: Nervous System Topic 11: Hormonal communication Topic 13: Reproduction		Topic 14: Variation and Evolution Topic 15: Genetics and Evolution Topic 16: Adaptations and Interdependence Revision for Mock Paper 1 Exam in May (75mins).	
	Subject Content: Pupils will learn different non-communicable diseases like cancer, smoking, obesity and alcohol abuse. In topic 8 students will recap KS3 knowledge of photosynthesis and leaf adaptations. Pupils will then explore how to plan an investigation to show how light intensity affect the rate of reaction. In topic 9, pupils learn about the need for respiration as well as the biochemistry involved. Higher Tier work will include the role of the liver in removing lactic acid.		Subject Content: Pupils will learn about the principles of homeostasis. They will then go onto explore how the nervous system works. Pupils go onto learn about reflexes and how to investigate a practical to measure reaction rate. In Topic 11, pupils learn about the endocrine system, paying particular attention to the pancreas. Pupils go onto explore the difference between type 1 and type 2 diabetes. Sex hormones used in the menstrual cycle are explored as well as how different contraceptives work.		Subject Content: Pupils will learn about the details involved in evolution by natural selection and how geographical isolation can result in speciation. Pupils will then learn about selective breeding, genetic engineering and then cloning. In topic 15, pupils will learn about the work of Mendel and how he used pea plants to show how features are inherited. Pupils will then use this to show how genetic diseases like CF are inherited. Topic 16 looks at communities and ecosystems. Exploring what factors affect populations and how you can use a quadrat to collect data about a species population size and distribution.	
	Learner Skills: Pupils will be stretched when they explore the mathematical concept of the inverse square law. Practically, students will learn how to design a practical and reinforce the concepts of what is an independent, dependent and control variable.		Learner Skills: Pupils will learn to use the correct terminology to explain how the reflex arc works. They will explore the errors and complications of measuring your reaction time using a ruler. Pupils will develop their understanding of the key command word: evaluate, when they explore the various contraceptive methods to avoid pregnancy.		Learner Skills: Pupils will learn to appreciate how biological ideas develop by looking at how Darwin built up his evidence for natural selection and overcame the barriers to the acceptance of his ideas. Pupils will develop their understanding on how to tackle questions that have ethical concerns, looking at different points of view.	
	Required practicals: Light intensity and the rate of photosynthesis.		Required practicals: Measuring reaction times with a ruler.		Required practicals: Measuring the population size and distribution of a plant in a habitat using a quadrat.	
	Rationale: Pupils will finish GCSE Paper 1 this term. This allow the department to test the whole Year group on an actual GCSE paper and see how their understanding is. Pupils will expand upon their basic principles of photosynthesis at KS3 and explore how to measure and calculate the rate of photosynthesis, and how different factors affect the rate. Pupils will also build on their knowledge of respiration by learning more about how an oxygen debt builds up during anaerobic respiration.		Rationale: Topic 12 is not taught at this time because it is a triple only topic. It will be taught when pupils have been identified as doing the double or triple award. Pupils will build upon their understanding of the neurones at KS3 by looking at the differences between motor and sensory neurones. Pupils will expand upon their basic understanding of human reproduction by looking at how sex hormones play a role in the menstrual cycle. Different types of contraception are linked in with PHSE lessons that are also covered at KS4 at this time.		Rationale: The topics of cloning and genetic engineering are very technical and difficult to understand and are taught at the end of Year 10. The summer weather is a great opportunity for classes to go outside and use quadrats to investigate different habitats. Pupils will expand upon their KS3 understanding of the nucleus and chromosomes by looking at the detailed structure of DNA, and about the variants called alleles. They will expand upon their understanding of cell division done in Year 9, by comparing mitosis with meiosis.	

In 2021-22, all Year 11 will sit separate (triple award) science GCSEs, taking advantage of any efforts made to simplify exams post-Covid. Students who struggles significantly with the challenge can sit foundation tier in biology as necessary, reducing the content to be learnt as well as avoiding the most demanding material.

All classes will sit a Paper 2 mock in November. All classes will sit a Paper 1 mock in March. After this, we will give further mock papers in class (using CGP papers as needed) in order to refine exam skills.

Decisions about higher tier or foundation tier will not be made until after the March mock.

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1
11	Topic 17: Organising an ecosystem Topic 18: Biodiversity and Ecosystems Revision for Mock Paper 2 Exam in November (105 minutes)		Topic 5 and 6: Triple content for Diseases and Preventing Diseases. Topic 10 and 11: Triple content for Nervous System and the Hormones. Topic 12: Homeostasis. Topic 13: Triple content for Reproduction. Revision for Mock Paper 1 Exam in February (105 minutes)		Revision and exam skills
	Subject Content: In topic 17, pupils learn about how materials are recycled by exploring the water, carbon and decay cycle. Pupils will learn about the factors that will affect the rate of decay. In topic 18, pupils will learn about how the human population explosion has had a direct impact on ecosystems. This will include water, land and air pollution. Linking in concepts from other subjects, including global warming and deforestation.		Subject Content: Pupils will be given booklets that explore the triple content only. This will include: plant diseases and defences; monoclonal antibodies; the structure and function of the brain and eye; how plant hormones work and how humans use them; DNA structure and protein synthesis. In topic 12, pupils will learn how the kidneys work in removing waste products. Then will then explore how kidney disease is treated by dialysis or kidney transplants.		Subject Content: None
	Learner Skills: Pupils develop their exam technique by looking at how to answer long structured questions (6 marks) that require pupils to use data or evaluate opinions. This will be assessed when pupils sit their mock examination in November.		Learner Skills: The focus again is on exam technique by using as many opportunities as possible in showing how to structure answers and how to read the questions carefully to understand what is being asked.		Learner Skills: Exam technique and revision skills.
	Required practicals: Investigate the effect of temperature on the rate of decay of fresh milk.		Required practicals: The effect of light on newly germinated seedlings.		Required practicals: Some required practicals may be done again to help pupils remember the detail in practicals that they did a long time ago.
	Rationale: Although these concepts have been taught already in Chemistry or Geography, they are taught now because pupils struggle to write down their thoughts and ideas clearly. This is particularly true for structured 6-mark questions.		Rationale: In this term, pupils look at completing the course by going back over the topics that were not covered in Year 9, 10 or 11 because they were triple content over. This allows Double Award pupils the opportunity to do more revision to help them with their exam technique and gaps in their understanding.		Rationale: The SOW has been structured so that at least 4-5 weeks have been set aside at the end of the course to enable pupils to go through a lot of different exam techniques that will develop their explanations and make them better prepared for their examinations.

The new A level course content is very similar to the old A level course and so the old modules serve as useful past papers for practice questions. The course content is in the order of the OCR A-level textbook that we use in class. This introduces biology from cells, moves onto tissues, organs and finally onto ecosystems and habitats. This is a logical order that starts on the foundation questions and then slowly builds on the content so that by Year 13 they are applying their understanding to more challenging concepts. The topics in the textbook are matched with Class Topic booklets for students to make notes with. These are regularly checked to make sure sufficient differentiation is achieved. Pupils are also given a Question booklet for each Topic to practise their exam, writing and literacy skills. The Year 13 course is considerably more challenging than the Year 12 course as almost none of the content has been met at GCSE. There is also a significant jump in the level of demand in exam questions and the mathematical difficulty of numerical questions (almost all of which involve multiple-step calculations).

	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Year 12	<p>Module 1: Development or practical skills. To include Planning, Implementing an investigation, analysis of qualitative and quantitative data, analysing graphs and evaluation.</p> <p>Module 2: Foundations in Biology</p> <p>Subject Content: cell structure, microscopes, biological molecules, nucleic acids, enzymes, biological molecules and cell division.</p> <p>Assessment: Knowledge and understanding is tested using past paper questions, online: eRevision software and vocab tests.</p>		<p>Module 1: Development or practical skills. To include Planning, Implementing an investigation, analysis of qualitative and quantitative data, analysing graphs and evaluation.</p> <p>Module 3: Exchange and Transport</p> <p>Subject Content: exchange surfaces, transport in animals and plants.</p> <p>Assessment: Knowledge and understanding is tested using past paper questions, online: eRevision software and vocab tests. Pupils also sit a one-hour mock examination.</p>		<p>Module 1: Development or practical skills. To include Planning, Implementing an investigation, analysis of qualitative and quantitative data, analysing graphs and evaluation.</p> <p>Module 4: Biodiversity, evolution and disease</p> <p>Subject Content: Communicable diseases, biodiversity, classification and evolution.</p> <p>Assessment: Knowledge and understanding is tested using past paper questions, online: eRevision software and vocab tests. Pupils sit two AS Exam Papers – Paper 1 – Breadth in Biology and Paper 2 – Depth in Biology</p> <p>Pupils will also have their PAG books assessed to see if they are on track. This will highlight to pupils what skills they need to focus on and what practicals to catch up on.</p>	
Year 13	<p>Module 1: Development or practical skills. To include Planning, Implementing an investigation, analysis of qualitative and quantitative data, analysing graphs and evaluation.</p> <p>Module 5: Communication, homeostasis and energy</p> <p>Subject Content: communication and homeostasis, excretion, neuronal communication, plant and animal responses, photosynthesis and respiration.</p> <p>Assessment: Knowledge and understanding is tested using past paper questions, online: eRevision software and vocab tests. Pupils will also sit a one-hour mock examination that will test them on Module 1 and Module 5.</p>		<p>Module 1: Development or practical skills. To include Planning, Implementing an investigation, analysis of qualitative and quantitative data, analysing graphs and evaluation.</p> <p>Module 6: Genetics and ecosystems</p> <p>Subject Content: Cellular control, patterns of inheritance, manipulating genomes, cloning and biotechnology, ecosystems and populations and sustainability.</p> <p>Assessment: Knowledge and understanding is tested using past paper questions, online: eRevision software and vocab tests. Pupils will sit a mock A2 Biology Exam Paper 1: Biological Processes [2 hours and 15mins]. This includes Modules 1, 2, 3 and 5. This will test pupils' understanding on both AS and A2 content.</p> <p>Pupils will also have their PAG books assessed to see if they have passed the Practical Element of the course.</p>		<p>A2 Exams</p> <p>Pupils will use the time before their examinations to address problem topics and improve their memory retention of specific facts.</p> <p>They will practise past paper questions and fine-tune their exam technique.</p> <p>Focus will be on preparing for Paper 3 which requires pupils to make synoptic links between topics.</p> <p>Time will also be used on going back over practicals to highlight the importance of the practical skills required for Module 1.</p>	