

EMMANUEL COLLEGE
THE SCIENCE DEPARTMENT

Year 10



Year 10	Autumn, Half-Term 1	Autumn, Half-Term 2
Unit Title	Plants	Respiration
Key Question(s)?	How do plants harness the energy of the sun?	How do cells produce energy using respiration?
Threshold Concepts	<p>Plants harness the sun's energy in photosynthesis in order to make food.</p> <p>Photosynthesis liberates oxygen which has built up over millions of years in the earth's atmosphere.</p> <p>Photosynthesis is represented by the equation: carbon dioxide + water -> glucose + oxygen.</p> <p>Water may move across cell membranes via osmosis. Osmosis is the diffusion of water from a dilute solution to a concentrated solution through a partially permeable membrane.</p>	<p>Cellular respiration is an exothermic reaction which is continuously occurring in living cells.</p> <p>Respiration in cells can take place aerobically (using oxygen) or anaerobically (without oxygen), to transfer energy.</p> <p>During exercise the human body reacts to the increased demand for energy.</p>
Link to Prior Learning	Photosynthesis was first covered in Year 8 during the biological processes topic.	Respiration was first covered in Year 8 during the biological processes topic.
	Spring Term	Summer Term
Unit Title	Nerves and Hormones	Reproduction
Key Question(s)?	How does the body bring about fast responses through the nervous system? How does the body bring about much slower changes through the hormonal system?	How do organisms reproduce and how does this lead to variation in offspring?
Threshold Concepts	<p>The nervous system enables humans to react to their surroundings and to coordinate their behaviour.</p> <p>Information from receptors passes along cells (neurones) as electrical impulses to the central nervous system (CNS). The CNS is the brain and spinal cord. The CNS coordinates the response of effectors which may be muscles contracting or glands secreting hormones.</p>	<p>Sexual reproduction involves the joining (fusion) of male and female gametes:</p> <ul style="list-style-type: none"> • Sperm and egg cells in animals. • Pollen and egg cells in flowering plants. <p>In sexual reproduction there is mixing of genetic information which leads to variety in</p>

	<p>Reflex actions are automatic and rapid; they do not involve the conscious part of the brain.</p> <p>Homeostasis is the regulation of the internal conditions of a cell or organism to maintain optimum conditions for function in response to internal and external changes.</p>	<p>the offspring. The formation of gametes involves meiosis.</p> <p>Asexual reproduction involves only one parent and no fusion of gametes. There is no mixing of genetic information. This leads to genetically identical offspring (clones). Only mitosis is involved.</p>
Link to Prior Learning	<p>This is the first time that the nervous and hormonal system has been introduced, although there are links to the KS3 topic on human reproduction.</p>	<p>This topic builds on the Year 8 unit on genes and evolution where students have been already introduced to how genetic information is passed on to offspring.</p>
Knowledge and Sequencing Rationale	<p>A1: All of the plant topics have been combined together at the start of Year 10 where it is hoped students will be more receptive to them and that the overlap between topics allows reinforcement of the ideas. Osmosis is a Paper 1 topic and normally comes earlier in Year 9, but it is one of the most conceptually difficult topics for students and we have chosen to move it here where it fits nicely with the plant transport topic.</p> <p>A2: Photosynthesis is a key concept that underpins the ecology topics. It follows on nicely from plant structure and links to the next topics on feeding relationships. Respiration is a key concept that students find more difficult; it could be studied after digestion and before active transport.</p> <p>SP1: Homeostasis is a more conceptually difficult topic found in Paper 2 it draws upon many of the earlier key concepts, e.g. specialised cells, enzymes, biological molecules, circulation, it needs to be taught later in the course and could come after the genetics topic.</p> <p>SP2: The more difficult regulation of the menstrual cycle is completed next.</p> <p>S1: Human impacts on the environment is a self-contained topic that could come earlier or later in the sequence, the concepts are suitable for Year 9, Year 10 or Year 11 although adaptations and decay should be taught first.</p> <p>S2: This is a difficult topic conceptually and younger students would find it difficult – it has therefore been left as late as possible in the teaching sequence.</p>	