OCR - GCSE Biology A - 2016		Nervous System Controls & Responds to Body Functions & Directs Behavior								Ne	Nervous System Structure & Function Are Determined By Both Genes & Environment Throughout Life								The B	The Brain is the Foundation of the Mind				Research Leads to Essential Understanding for Therapies				
		1. Brain is the body's most complex organ.			2. Neurons communicate using electrical and chemical signals.						3. Genetically determined circuits are foundation of the nervous system.				. Life exp		es change the	nervous	5. Intelligence arises as brain reasons, plans,			The brain makes it possible to communicate owledge through	7. Human brain endows us with a natural curiosity to understand how the world works.			discoveries promote		
Topic Topic B1: Cell level systems	Learning Objective	a b	С	d	e f	а	b	c d	e f	g	а	b	c d	e	f a	b	С	d e	f g	a b	C	1	language.  a b	а	b	С	а	b c d
	B1.1b explain how the main sub-cellular structures of eukaryotic cells (plants and animals) and prokaryotic cells are related to their functions.							•																				
	B1.1c explain how electron microscopy has increased our understanding of sub-cellular structures.	•						•																				
B1.2 What happens in cells (and what do cells need)? B1.3 Respiration																												
B1.4 Photosynthesis  Topic B2: Scaling up																												
	B2.1c explain the importance of cell differentiation. the production of specialised cells allowing organisms to become more efficient and examples of specialised cells.  B2.1d recall that stem cells are present in embryonic and	•									•					•			•									
	adult animals and meristems in plants.  B2.1e describe the functions of stem cells.	•			•						•					•			•					•			•	• • •
	B2.1f describe the difference between embryonic and adult stem cells in animals.	•			•						•					•			•					•			•	• • •
B2.2 The challenges of size  Topic B3: Organism level systems																												
B3.1 Coordination and control – the nervous system	B3.1a describe the structure of the nervous system. Central Nervous System, sensory and motor neurones and sensory receptors.  B3.1b explain how the components of the nervous system	•	•			•	•	•	•	•	•	•	• •			•		•										
	can produce a coordinated response. It goes to all parts of the body, has many links, has different sensory receptors and is able to coordinate responses.	•	•			•	•	•	•	•	•	•	•	•		•		•										
	B3.1c explain how the structure of a reflex arc is related to its function.  B3.1d explain how the main structures of the eye are related to their functions.	•				•	•	•				•	•	•														
	B3.1e describe common defects of the eye and explain how some of these problems may be overcome. Colour blindness, short-sightedness and long-sightedness.  B3.1f describe the structure and function of the brain.  Cerebrum, cerebellum, medulla, hypothalamus, pituitary.	• •	•		•	•	•	•	•			•	•					•		•								
	B3.1g explain some of the difficulties of investigating brain function. The difficulty in obtaining and interpreting case studies and the consideration of ethical issues.  B3.1h explain some of the limitations in treating damage	• •								•			•	•										•			•	•
	and disease in the brain and other parts of the nervous system. Limited ability to repair nervous tissue, irreversible damage to the surrounding tissues, difficulties with accessing parts of the nervous system.	•			•					•						•	•	٠	•			ı						
endocrine system	B3.2a describe the principles of hormonal coordination and control by the human endocrine system. Use of chemical messengers, transport in blood, endocrine glands and receptors.			•																								
	B3.2b explain the roles of thyroxine and adrenaline in the body. Thyroxine as an example of a negative feedback system.			•																								
environments	B3.3a explain the importance of maintaining a constant internal environment in response to internal and external change. Allowing metabolic reactions to proceed at appropriate rates.			•																								
	B3.3b describe the function of the skin in the control of body temperature.detection of external temperature, sweating, shivering, change to blood flow.  B3.3c explain how insulin controls blood sugar levels in the					•						•																
	body.  B3.3d explain how glucagon interacts with insulin to control																											
	B3.3i describe the effect of ADH on the permeability of the kidney tubules. Amount of water reabsorbed and negative feedback.			•																								
	B3.3j explain the response of the body to different temperature and osmotic challenges. Challenges to include high sweating and dehydration, excess water intake, high salt intake responses to include mechanism of kidney function, thirst.					•						•																
B4.1 Ecosystems																												
Topic B5: Genes, inheritance and selection B5.1 Inheritance																												
B5.2 Natural selection and evolution  Topic B6: Global challenges																												
B6.1 Monitoring and maintaining the environment																												
B6.2 Feeding the human race	B6.2d describe genetic engineering as a process which involves modifying the genome of an organism to introduce desirable characteristics.				•						•				•									•			•	• •
health	B6.3c describe the interactions between different types of disease.  B6.3q describe the processes of discovery and development of potential new medicines.			•	•																						•	• •
	B6.3r recall that many non-communicable human diseases are caused by the interaction of a number of factors.			•	•																							
	B6.3t analyse the effect of lifestyle factors on the incidence of noncommunicable diseases at local, national and global levels. Lifestyle factors to include exercise, diet, alcohol and smoking.			•	•																							
	B6.3v discuss potential benefits and risks associated with the use of stem cells in medicine. Tissue transplantation and rejection.  B6.3w explain some of the possible benefits and risks of	•			•						•					•			•					•			•	• •
	using gene technology in medicine. Practical and ethical considerations.				•						•				•									•			•	•
	B6.3x discuss the potential importance for medicine of our increasing understanding of the human genome. The ideas of predicting the likelihood of diseases occurring and their treatment by drugs which are targeted to genomes.				•						•				•									•			•	• • •

KEY			Description								
Nervous System Controls	1. The brain is the body's most	a	There are a hundred billion neurons in the human brain, all of which are in use.								
	complex organ.	b	Each neuron communicates with many other neurons to form circuits and share information.								
and Responds to Body	oempren ergann	C	Proper nervous system function involves coordinated action of neurons in many brain regions.								
Functions and Directs Behavior		d	The nervous system influences and is influenced by all other body systems (e.g., cardiovascular, endocrine, gastrointestinal								
		0	and immune systems).  Humans have a complex nervous system that evolved from a simpler one.								
		f	This complex organ can malfunction in many ways, leading to disorders that have an enormous social and economic								
	2. Neurons communicate using	2	Sensory stimuli are converted to electrical signals.								
	electrical and chemical signals.		Action potentials are electrical signals carried along neurons.								
	ciccurcar and circumcar signals.	C	Synapses are chemical or electrical junctions that allow electrical signals to pass from neurons to other cells.								
		<u>с</u>	Electrical signals in muscles cause contraction and movement.								
		<u> </u>	Changes in the amount of activity at a synapses can enhance or reduce its function.								
		f	Communication between neurons is strengthened or weakened by an individual's activities, such as exercise, stress, and								
			drug use.								
		g	All perceptions, thoughts, and behaviors result from combinations of signals among neurons.								
Nervous System Structure	3. Genetically determined circuits are foundation of the	a	Neuronal circuits are formed by genetic programs during embryonic development and modified through interactions with the internal and external environment.								
and Function are Determined by Both	nervous system.	b	Sensory circuits (sight, touch, hearing, smell, taste) bring information to the nervous system, whereas motor circuits send information to muscles and glands.								
<b>Genes and Environment</b>		С	The simplest circuit is a reflex, in which sensory stimulus directly triggers an immediate motor response.								
Throughout Life		d	Complex responses occur when the brain integrates information from many brain circuits to generate a response.								
		e	Simple and complex interactions among neurons take place on time scales ranging from milliseconds to months.								
		f	The brain is organized to recognize sensations, initiate behaviors, and store and access memories that can last a lifetime.								
	4. Life experiences change the	a	Differences in genes and environments make the brain of each animal unique.								
	nervous system.	b	Most neurons are generated early in development and survive for life.								
		C	Some injuries harm nerve cells, but the brain often recovers from stress, damage, or disease.								
		d	Continuously challenging the brain with physical and mental activity helps maintain its structure and function - "use it or lose it."								
		e	Peripheral neurons have greater ability to regrow after injury than neurons in the brain and spinal cord.								
		f	Neuronal death is a natural part of development and aging.								
		g	Some neurons continue to be generated throughout life and their production is regulated by hormones and experience.								
The Brain is the Foundation of the Mind	5. Intelligence arises as brain reasons, plans, and solves	а	The brain makes sense of the world by using all available information, including senses, emotions, instincts, and remembered experiences.								
	problems.	b	Emotions are based on value judgments made by our brains and are manifested by feelings as basic as love and anger and as complex as empathy and hate.								
		С	The brain learns from experiences and makes predictions about best actions in response to present and future challenges.								
		d	Consciousness depends on normal activity of the brain.								
	6. The brain makes it possible	a	Languages are acquired early in development and facilitate information exchange and creative thought.								
	to communicate knowledge through language.	b	Communication can create and solve many of the most pressing problems humankind faces.								
Research Leads to	7. The human brain endows us	a	The nervous system can be studied at many levels, from complex behaviors such as speech or learning, to the interactions								
<b>Essential Understanding</b>	with a natural curiosity to	h	among individual molecules.  Research can ultimately inform us about mind, intelligence, imagination, and consciousness.								
for Therapies	understand how the world works.	C C	Curiosity leads us to unexpected but surprising discoveries that can benefit humanity.								
	8. Fundamental discoveries	a	Experiments on animals play a central role in providing insights about the human brain and in helping to make healthy								
	promote healthy living and		lifestyle choices, prevent disease, and find cures for disorders.								
	treatment of disease.	D	Research on humans is an essential final step before new treatments are introduced to prevent or cure disorders.								
		C	Neuroscience research has formed the basis for significant progress in treating a large number of disorders.								
		d	Finding cures for disorders of the nervous system is a social imperative.								