OCR - GCSE Biology B - 2016		Nervous System Controls & Responds to Body Functions & Directs Behavior						N	Nervous System Structure & Function Are Determined By Both Genes & Environment Throughout Life						The Brain is the Foundation of the Mind				Research Leads to Essential Understanding for Therapies					
		1. Bra	in is the bo o	ody's m rgan.	ost con	nplex	2. Neurons communicate using electrical and chemical signals.	d 3. Ge fou	enetical Indatior	ly dete n of the	ermineo e nervo	d circuits aro ous system.	e 4. Life experiences change the nervous system.	5. Int brai	elliger in reas olves p	nce arises as sons, plans, problems.	6. The broose pose comm knowled lang	ain makes it sible to nunicate Ige through guage.	7. Human brain us with a na curiosity to und how the world	endows tural lerstand works.	8. disco hea treat	Fundai overies althy liv ment o	mental promc /ing an of disea	l ote id ase.
Topic Chapter B1: You and your genes	Learning Objective	а	b c	d	е	f	a b c d e f g	а	b	с	d	e f	a b c d e f g	а	b	c d	а	b	a b	с	а	b	с	d
B1.1 What is the genome and what does it do?	1. a) explain how the nucleus and genetic material of eukaryotic cells (plants and animals) and the genetic material, including plasmids, of prokaryotic cells are related						•																Τ	
	to cell functions. <u>1. b) describe how to use a light microscope to observe a</u> <u>variety of plant and animal cells.</u>		•				• • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • • •																	
B1.2 How is genetic information inherited? B1.3 How can and should gene	<u>1. discuss the potential importance for medicine of our</u>							ŀ																
technology be used?	increasing understanding of the human genome, including the discovery of alleles associated with diseases and the genetic testing of individuals to inform family planning and					•		•					•						•		•	•	•	•
	<u>healthcare.</u> <u>4. explain some of the possible benefits and risks, including</u> <u>practical and ethical considerations, of using gene</u>					•		•					• • • • • • • • • • • • • • • • • • •	T					•		•	•	•	•
Chapter B2: Keeping healthy B2.1 What are the causes of disease	technology in modern agriculture and medicine. ? 2. describe different types of diseases (including																							
B2.2 How do organisms protect themselves against pathogens?	communicable and non-communicable diseases).																							
B2.3 How can we prevent the spread of infections?B2.4 How can we identify the cause																								
of an infection? (separate science only) B2.5 How can lifestyle, genes and th	e <u>1. a) describe how the interaction of genetic and lifestyle</u>							P						÷										
environment affect my health?	<u>factors can increase or decrease the risk of developing non-</u> <u>communicable human diseases, including cardiovascular</u> <u>diseases, many forms of cancer, some lung and liver</u>			•		•																		
	<u>2 diabetes.</u> <u>2. use given data to explain the incidence of non-</u>																							
	<u>communicable diseases at local, national and global levels</u> with reference to lifestyle factors, including exercise, diet, alcohol and smoking.			•		•																		
B2.6 How can we treat disease?	 <u>4. describe interactions between different types of disease.</u> <u>4. describe the process of discovery and development of potential new medicines including preclinical and clinical</u> 			•		•		ľ													•	•	•	•
Chapter B3: Living together – food and ecosystems	testing.			_											_								_	
B3.1 What happens during photosynthesis? B3.2 How do producers get the								ŀ																
B3.3 How are organisms in an ecosystem interdependent?																								
B3.4 How are populations affected b conditions in an ecosystem? Chapter B4: Using food and																								
controlling growth B4.1 What happens during cellular respiration?																								
B4.2 How do we know about mitochondria and other cell structures?	<u>1. explain how electron microscopy has increased our</u> understanding of sub-cellular structures.		•				•																	
B4.3 How do organisms grow and develop?	 <u>4. describe the function of stem cells in embryonic and adult</u> <u>animals and meristems in plants.</u> <u>5. explain the importance of cell differentiation, in which</u> 	•				•		ŀ					· · ·						•		•	•	•	•
B4.4 How is plant growth controlled	<u>cells become specialised by switching genes off and on to</u> <u>form tissues with particular functions.</u> ?	•						•						H										
(separate science only) B4.5 Should we use stem cells to treat damage and disease?	<u>1. discuss potential benefits, risks and ethical issues</u> associated with the use of stem cells in medicine.							•					• • • • • •											
Chapter B5: The human body – staying alive B5.1 How do substances get into, ou	t																							
of and around our bodies? B5.2 How does the nervous system help us respond to changes?	<u>1. explain how the components of the nervous system work</u> together to enable it to function, including sensory									•	•													
	effectors. 2. explain how the structures of nerve cells and synapses																							
	<u>(Learners are not expected to explain nerve impulse</u> <u>transmission in terms of membrane potentials</u>		• •				• • • • • • • •	·	•	•	•	•	• •											
	 3. a) explain how the structure of a reflex arc, including the relay neuron, is related to its function. 3. b) describe practical investigations into reflex actions. 		•				• • • • •		•	•		•												
	<u>4. describe the structure and function of the brain and roles</u> of the cerebral cortex (intelligence, memory, language and consciousness), cerebellum (conscious movement) and brain	•	• •						•		•	•		•		•								
	<u>science only).</u> <u>5. explain some of the difficulties of investigating brain</u>	•	•				· · ·				•	•							•		•	•		
B5.3 How do hormones control responses in the human body?	2. explain the roles of thyroxine and adrenaline in the body, including thyroxine as an example of a negative feedback			•				Γ																
B5.4 Why do we need to maintain a constant internal environment?	2. a) describe the function of the skin in the control of body temperature, including changes to sweating, hair erection						• • • • • • • • • • • • • • • • • • •	Γ	•															
	b) describe practical investigations into temperature control of the body.						•		•															
	<u>challenges, including receptors, processing, responses and</u> <u>negative feedback (separate science only).</u>						•		•															
	<u>kidney tubules (separate science only).</u> 7. explain the response of the body to different osmotic challenges, including receptors, processing, response, and			•				h																
B5.5 What role do hormones play in	negative feedback (separate science only).																							
B5.6 What can happen when organs and control systems stop working?	2. explain how glucagon and insulin work together to control the blood sugar level in the body.			•																				
	<u>to their functions, including the cornea, iris, lens, ciliary</u> <u>muscle and retina and to include the use of ray diagrams.</u>		•				•		•															
	b) describe practical investigations into the response of the pupil in different light conditions. 5. describe common defects of the eye, including short- of		•				• • • • • • • • • • • • • • • • • • •	ŀ	•					H										
	<u>cataracts, and explain how these problems may be</u> <u>overcome, including using ray diagrams to illustrate the</u>					•																		
	6. explain some of the limitations in treating damage and disease in the brain and other parts of the nervous system (separate science only)		•			•																		
Chapter B6: Life on Earth – past, present and future																								
evolution developed? B6.2 How do sexual and asexual																								
(separate science only) B6.3 How does our understanding of	f																							
of organisms on Earth? B6.4 How is biodiversity threatened																								

KEY			Description							
Nervous System Controls	1. The brain is the body's most	а	There are a hundred billion neurons in the human brain, all of which are in use.							
and Responds to Body	complex organ.	b	Each neuron communicates with many other neurons to form circuits and share information.							
Functions and Directs		с	Proper nervous system function involves coordinated action of neurons in many brain regions.							
Behavior		d	The nervous system influences and is influenced by all other body systems (e.g., cardiovascular, endocrine, gastrointestinal and immune systems).							
		е	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	a	Sensory stimuli are converted to electrical signals.							
	electrical and chemical signals.	b	Action potentials are electrical signals carried along neurons.							
		с	Synapses are chemical or electrical junctions that allow electrical signals to pass from neurons to other cells.							
		d	Electrical signals in muscles cause contraction and movement.							
		е	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	a	Neuronal circuits are formed by genetic programs during embryonic development and modified through interactions with							
and Eurotion are	circuits are foundation of the	-	the internal and external environment.							
Determined by Both	termined by Both nervous system.		Sensory circuits (sight, touch, hearing, smell, taste) bring information to the nervous system, whereas motor circuits send information to muscles and glands.							
Genes and Environment		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.							
		е	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	а	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.							
		с	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."							
		е	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	5. Intelligence arises as brain reasons, plans, and solves	a	The brain makes sense of the world by using all available information, including senses, emotions, instincts, and remembered experiences.							
Foundation of the Mind	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	а	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	а	The nervous system can be studied at many levels, from complex behaviors such as speech or learning, to the interactions among individual molecules.							
Essential Understanding										

for Therapies	understand how the world	b	Research can ultimately inform us about mind, intelligence, imagination, and consciousness.								
	works.	c	Curiosity leads us to unexpected but surprising discoveries that can benefit humanity.								
	8. Fundamental discoveries	а	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.	b	Research on humans is an essential final step before new treatments are introduced to prevent or cure disorders.								
		С	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.								