Edexel - GCSE Biology - 2016			Nervous System Controls & Responds to Body Functions & Directs Behavior									Nervous System Structure & Function Are Determined By Both Genes & Environment Throughout Life								y	The Brain is the Foundation of the Mind						Research Leads to Essential Understanding for Therapies									
	1. Brain			Brain is the body's most complex organ.				2. Neurons communicate using electrical an chemical signals.				cal and	3. Genetically determined circuits are foundation of the nervous system.				4. Life experiences change the nervous system.					is 5	5. Intel brain solv	lligence a reasons, /es probl	arises as plans, ems.	6. The brain makes it possible to communicate knowledge through language.		7. Human brain endows us with a natural curiosity to understand how the world works.			8. disco hea treati	8. Fundamental discoveries promote healthy living and treatment of disease.				
Торіс	Learning Objective	а	b	c	d	e	f	a b	С	c	d e	f	g	а	b c	d	e	f	a b	o c	d	е	f	g	a	b c	d	а	b	а	b	с	а	b	с	d
Topic 1 – Key concepts in biology	1.1 Explain how the sub-cellular structures of eukaryotic and																	-																		
	prokaryotic cells are related to their functions, including: a animal cells – nucleus, cell membrane, mitochondria and								•																											
	<u>ribosomes.</u> <u>1.3 Explain how changes in microscope technology,</u>																																			
	<u>structures with more clarity and detail than in the past and</u>		•						•																											
Topic 2 – Cells and control	2.6 Explain the importance of cell differentiation in the																																			
	development of specialised cells. 2.8 Describe the function of embryonic stem cells, stem cells	•			_	_								•				÷	•					•												
	in animals and meristems in plants. 2.9 Discuss the potential benefits and risks associated with	•					•							•										•						•			•	•	•	•
	the use of stem cells in medicine.2.10B Describe the structures and functions of the brain																																			
	<u>medulla oblongata.</u>	•	•	•			_	• •	•			•			•	•		•			•			_	•		•									
	<u>inside the skull can be overcome by using CT scanning and</u> PFT scanning to investigate brain function.	•	•										•			•	•													•			•	•		
	2.12B Explain some of the limitations in treating damage and disease in the brain and other parts of the nervous		•				•						•									•														
	<u>system, including spinal injuries and brain tumours.</u> 2.13 Explain the structure and function of sensory receptors,			_														-																		
	sensory neurones, relay neurones in the CNS, motor neurones and synapses in the transmission of electrical		•	•					•			•	•	•	• •	•					•															
	impulses, including the axon, dendron, myelin sheath and the role of neurotransmitters.																																			
	2.14 Explain the structure and function of a reflex arc including sensory, relay and motor neurones.		•					• •	•		•				• •		•																			
	2.15B Explain the structure and function of the eye as a sensory receptor including the role of:																																			
	a the cornea and lens b the iris		•					•							•																					
	<u>c rod and cone cells in the retina.</u> <u>2.16B Describe defects of the eye including cataracts,</u>						•											T						1												
	<u>2.17B Explain how cataracts, long-sightedness and short-</u>						•																													
Topic 3 – Genetics	2.21 Discuss the outcomes of the Human Conome Project																																			_
Topic 4 – Natural selection and	and its potential applications within medicine.						•							•					•											•			•	•	•	•
genetic modification	4.14 Evaluate the benefits and risks of genetic engineering						_																													
	and selective breeding in modern agriculture and medicine, including practical and ethical implications.						•							•					•											•			•	•	•	•
Topic 5 – Health, disease and the development of medicines								<b>I</b>																												
	5.3 Explain why the presence of one disease can lead to a higher susceptibility to other diseases.						•																													
	5.20 Describe that the process of developing new medicines, including antibiotics, has many stages, including						•																										•	•	•	•
	discovery, development, preclinical and clinical testing. 5.23 Describe that many non-communicable human																																			
	diseases are caused by the interaction of a number of factors, including cardiovascular diseases, many forms of				•		•																													
	cancer, some lung and liver diseases and diseases influenced by nutrition.																																			
functions							_											_																		
control and homeostasis	7.1 Describe where hormones are produced and how they			_					_	_								-																		
	are transported from endocrine glands to their target organs, including the pituitary gland, thyroid gland,				•																															
	pancreas, adrenal glands, ovaries and testes. 7.2 Explain that adrenalin is produced by the adrenal glands																	4																		
	to prepare the body for fight or flight, including: a increased heart rate																																			
	<u>b increased blood pressure</u> <u>c increased blood flow to the muscles</u>				•																															
	d raised blood sugar levels by stimulating the liver to change glycogen into glucose																																			
	7.3 Explain how thyroxine controls metabolic rate as an example of negative feedback, including:																																			
	a low levels of thyroxine stimulates production of TRH in hypothalamus				•																															
	<u>c TSH acts on the thyroid to produce thyroxine</u>																																			
	release of TRH and the production of TSH		_				_											4																		
	<u>reference to the function of the skin, including:</u>																																			
	<u>b the role of the epidermis</u> c the role of the hypothalamus																																			
	7.12B Explain how thermoregulation takes place, with reference to:																																			
	<u>a shivering</u> <u>b vasoconstriction</u>							•							•																					
	<u>c vasodilation</u> 7.13 Explain how the hormone insulin controls blood																																			
	glucose concentration. 7.14 Explain how blood glucose concentration is regulated				•																															
	by glucagon. 7.20B Explain the effect of ADH on the permeability of the				•																															
Topic 8 – Exchange and transport in	collecting duct in regulating the water content of the blood.				•																															
animals Topic 9 – Ecosystems and material																																				
cycles																																				

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	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.							
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.									