GCSE Biology Paper 2 Personal Learning Checklist

Can you…?	Confidence		
	1	2	3
5 Homeostasis and Response			
Homeostasis			
Define homeostasis.			
Name three levels maintained by homeostasis.			
State that automatic control systems may involve nervous responses or chemical responses.			
Define receptors, coordination centres and effectors.			

The human nervous system			
Explain how the structure of the nervous system is adapted to its functions.			
State the main function of the nervous system.			
Describe how information from receptors is carried to the brain to coordinate the response.			
Describe the roles of sensory neurones, relay neurones, motor neurones, synapses and effectors in a reflex action, and state that reflex actions are automatic and rapid.			
Identify the cerebral cortex, cerebellum is concerned and medulla on a diagram of the brain. **(biology only)**			
Describe the function of the cerebral cortex, cerebellum is concerned and medulla. **(biology only)**			
Describe how neuroscientists have been able to map the regions of the brain to particular functions. **(biology HT only)**			
Relate the structures of the eye to their functions, including accommodation to focus on near or distant objects and adaptation to dim light. **(biology only)**			
Explain the function of the retina, the optic nerve, the sclera, the iris and the ciliary muscles. **(biology only)**			
Describe myopia and hyperopia and how they are treated with spectacle lenses. **(biology only)**			
Describe how new technologies and used to treat eye defects. **(biology only)**			
Interpret ray diagrams demonstrating how spectacle lenses correct myopia and hyperopia. **(biology only)**			
Explain mechanisms to lower or raise body temperature in a given context. **(HT only)**			

Hormonal coordination in humans			
Define hormones and their rate of effect.			
Describe the functions and main organs of the endocrine system.			
Describe the function of the pituitary gland.			
Identify the position of the pituitary gland, pancreas, thyroid, adrenal gland, ovaries and testes on a diagram of the human body.			
Explain the role of the pancreas and insulin in the control of blood glucose concentration.			
Compare Type 1 and Type 2 diabetes and explain how they can be treated.			
Recall that If the blood glucose concentration is too low, the pancreas produces glucagon that causes glycogen to be converted into glucose and released into the blood. **(HT only)**			

Explain how glucagon interacts with insulin to control blood glucose (sugar) levels in the body. **(HT only)**			
State that during puberty reproductive hormones cause secondary sex characteristics to develop.			
State that testosterone is the main male reproductive hormone produced by the testes and it stimulates sperm production.			
Explain the interactions of hormones in the control of the menstrual cycle. **(HT only)**			
Evaluate the different hormonal and non-hormonal methods of contraception.			
Explain the use of hormones to treat infertility. **(HT only)**			
State some problems with fertility treatment.			
Explain negative feedback. **(HT only)**			
State two hormones that are controlled by negative feedback and their function. **(HT only)**			

Plant hormones (biology only)			
Explain how plants use hormones to coordinate and control growth in response to light and gravity. **(biology only)**			
Describe the role of gibberellins and ethane in plants. **(biology HT only)**			
Describe some uses of plant hormones in agriculture and horticulture. **(biology HT only)**			

Hormonal coordination in humans			
Students should be able to explain how mechanisms lower or raise body temperature in a given context. **(HT only)**			
Explain how the body maintains water and nitrogen balance in the body.			
Recall that excess water, ions and urea are removed via the kidneys in the urine.			
Explain the role of the liver in deaminated to form ammonia and that ammonia is toxic and so it is immediately converted to urea for safe excretion. **(HT only)**			
The kidneys produce urine by filtration of the blood and selective reabsorption of useful substances such as glucose, some ions and water.			
Describe the role of ADH in controlling the water level in the body. **(HT only)**			
Know how people who suffer from kidney failure may be treated.			

6 Inheritance, Variation and Evolution

Reproduction and Genetics			
Describe sexual and asexual reproduction.			
Name the sex cells in plants and animals.			
Explain meiosis to form gametes.			
Recall that gametes join at fertilisation to restore the normal number of chromosomes.			
Explain how cell divide by mitosis.			
List some advantages and disadvantages of sexual reproduction. **(biology only)**			
List some advantages and disadvantages of asexual reproduction. **(biology only)**			
Recall that some organisms reproduce by both methods depending on the circumstances.			
Define a gene.			
Define the term genome.			
Discuss the importance of understanding the human genome.			
Recall the four bases and their complimentary pairing. **(biology only)**			

Explain how the bases code for proteins. **(biology only)**			
Describe the DNA polymer. **(biology only)**			
Explain how a change in DNA structure result in a change in the protein synthesised. **(biology only)**			
Explain how proteins are synthesised on ribosomes, according to a template. **(biology HT only)**			
Recall that when the protein chain is complete it folds up to form a unique shape. Which enables the proteins to do their job as enzymes, hormones or forming structure. **(biology HT only)**			
Recall that mutations occur continuously and most do not alter the protein. **(biology HT only)**			
Not all parts of DNA code for proteins. Non-coding parts of DNA can switch genes on and off, so variations in these areas of DNA may affect how genes are expressed. **(HT only)**			
Explain the difference between genotype and phenotype.			
Explain dominant and recessive alleles .			
Define homozygous and heterozygous.			
Recall that most characteristics are a result of multiple genes interacting.			
Understand family trees.			
Use a Punnett square diagram to predict the outcome of a monohybrid cross.			
Name an Inherited disorder caused by a dominant allele.			
Name an Inherited disorder caused by a recessive allele.			
Recall the number of pairs of chromosomes in an ordinary human body.			
State the pairs of chromosomes that carries the genes that determine sex.			
Explain single gene inheritance and carry out a genetic cross to show sex inheritance.			

Variation and evolution			
Describe variation.			
Give causes of variation.			
Explain how explain how evolution occurs through natural selection.			
Describe selective breeding.			
Define some chosen characteristics for selective breeding.			
Explain the problems with 'inbreeding'.			
Describe genetic engineering.			
Give examples of uses of genetic engineering.			
Define GM crop and give examples.			
State some concerns about GM crops.			
Recall the possibility of genetic modification to overcome some inherited diseases.			
Explain plant cloning tissue culture and cuttings. **(biology only)**			
Explain animal cloning by embryo transplants and adult cell cloning. **(biology only)**			

The development of understanding of genetics and evolution			
Explain theory of evolution by natural selection proposed by Charles Darwin. **(biology only)**			

State reason why the theory of evolution by natural selection was only gradually accepted.			
Recall the theory of Jean-Baptiste Lamarck.			
Summarise the work of Alfred Russel Wallace into speciation. **(biology only)**			
State some cause for new species to arise. **(biology only)**			
Recall some history of the understanding of genetics including: **(biology only)** • In the mid-19th century Gregor Mendel carried out breeding experiments on plants. • In the late 19th century behaviour of chromosomes during cell division was observed. • the structure of DNA was determined in the mid-20th century.			
Understand why the importance of Mendel's discovery was not recognised until after his death.			
State evidence for evolution by natural selection.			
Define fossils and explain how they are formed.			
Explain why there are no fossils of many early forms of life.			
Recall that we can learn from fossils how much or how organisms have changed.			
List some possible causes of extinction.			
Explain the emergence of antibiotic resistant bacteria.			
Recall that MRSA is resistant to antibiotics.			
Describe how to reduce the rate of development of antibiotic resistant strains.			

Classification of living organisms			
Describe the Linnaeus system to classify living things and name the levels.			
State that organisms are named by the binomial system of genus and species.			
Know that new models of classification have been proposed based on improved analysis.			
Define the 'three-domain system' developed by Carl Woese.			
Understand that evolutionary trees are a method used by scientists to show how they believe organisms are related.			

7 Ecology

Adaptations, interdependence and competition			
Suggest the factors for which organisms are competing in a given habitat.			
Suggest how organisms are adapted to the conditions in which they live.			
Define an ecosystem.			
Define interdependence.			
Explain what is meant by a 'stable community'.			
Explain how a change in an abiotic factor would affect a given community.			
List abiotic factors.			
Explain how a change in a biotic factor might affect a given community.			
List biotic factors.			
Explain how organisms are adapted to live in their natural environment.			
Explain the use of transects and quadrats.			
Explain why, in a stable community, the numbers of predators and prey rise and fall in cycles.			

Organisation of an ecosystem			
Define a producer, primary consumers, secondary consumers and tertiary consumers.			
Construct food chains.			
Recall the carbon cycle.			
Recall the water cycle.			
Explain the role of microorganisms in cycling materials through an ecosystem.			
State factors which affect the rate of decay. **(biology only)**			
Recall that biogas generators can be used to produce methane gas as a fuel.			
Evaluate the impact of environmental changes on the distribution of species in an ecosystem given appropriate information. **(biology only)**			
State some environmental changes.			

Biodiversity and the effect of human interaction on ecosystems			
Define biodiversity.			
State the benefit of ensuring a great biodiversity.			
Explain how human activities are reducing biodiversity.			
Understand that rapid growth in the human population and an increase in the standard of living mean that increasingly more resources are used and more waste is produced. Unless waste and chemical materials are properly handled, more pollution will be caused.			
Explain how pollution can occur on land, in air and in water.			
State how humans reduce the amount of land available for other animals.			
Explain the destruction of peat bogs.			
State why large-scale deforestation in tropical areas has occurred.			
List the consequences of deforestation.			
Describe global warming.			
State the biological consequences of global warming.			
Explain how humans are trying to reduce these negative effects.			

Trophic levels in an ecosystem (biology only)			
List the tropic levels. **(biology only)**			
State the role of decomposers. **(biology only)**			
Construct a pyramid of biomass. **(biology only)**			
Explain how the loss of biomass at each trophic level affects the number of organisms at each level. **(biology only)**			
Recall that only approximately 10% of the biomass from each trophic level is transferred to the level above it. **(biology only)**			
State reason for losses of biomass			

Food production (biology only)			
List some factors affecting food security. **(biology only)**			
Explain 'Factory farming' to restrict energy transfer from food animals to the environment. **(biology only)**			
Explain sustainable fishing security. **(biology only)**			
Understand that modern biotechnology techniques enable large quantities of microorganisms to be cultured in industrially controlled vats for food. **(biology only)**			
State that the fungus Fusarium is useful for producing mycoprotein. **(biology only)**			
Recall that GM bacterium produces human insulin. **(biology only)**			

Required Practicals

Required practical activity 7: plan and carry out an investigation into the effect of a factor on human reaction time.			
Required practical activity 8: investigate the effect of light or gravity on the growth of newly germinated seedlings.			
Required practical activity 9: measure the population size of a common species in a habitat. Use sampling techniques to investigate the effect of a factor on the distribution of this species.			
Required practical activity 10: investigate the effect of temperature on the rate of decay of fresh milk by measuring pH change.			

Mathematical Skills (Paper 1+2)

Arithmetic and Numerical Computation	Express numbers in decimal form.			
	Express numbers in standard form.			
	Use ratios, fractions and percentages.			
	Make estimates of the results of simple calculations.			
Handling Data	Use an appropriate number of significant figures/			
	Calculate the mean.			
	Understand the terms mean, mode and median.			
	Make order of magnitude calculations.			
Algebra	Understand and use the symbols: =, <, <<, >>, >, α, ~			
	Change the subject of an equation.			
	Substitute numerical values into equations using appropriate units.			
Graphs	Understand that $y = mx+c$ represents a linear relationship.			
	Plot a line graph from experimental data, including drawing a line of best fit.			
	Determine the gradient and intercept of a linear graph.			
	Draw a tangent to a curve and calculate its gradient as a measure of the rate of change.			
Geometry and Trigonometry	Visualise and represent 2D and 3D forms.			
	Calculate areas of triangles and rectangles.			
	Calculate surface areas and volumes of cubes.			