GCSE Biology Paper 1 Personal Learning Checklist

Can you…?	Confidence		
	1	2	3
1 Cell Biology			
Cell Structure			
Name the main organelles of plant and animal cells (eukaryotic cells).			
Recall the relative size of bacterial cells (prokaryotic cells).			
Describe the difference in how the genetic material is found within eukaryotic and prokaryotic cells.			
Explain how the main sub-cellular structures, including the nucleus, cell membranes, mitochondria, cell wall and chloroplasts in plant cells and plasmids in bacterial cells are related to their functions.			
Explain how the structure of different types of cell relate to their function in a tissue, an organ or organ system, or the whole organism. Including sperm cells, nerve cells and muscle cells in animals and root hair cells, xylem and phloem cells in plants.			
Describe cell differentiation.			
Describe the differences in magnification and resolution between electron and light microscopes.			
Define binary fission **(biology only)**.			
Explain how to prepare an uncontaminated culture **(biology only)**.			
Transport in cells			
Explain how substances may move into and out of cells across the cell membranes via diffusion.			
Describe diffusion.			
Recall that some of the substances transported in and out of cells by diffusion are oxygen and carbon dioxide in gas exchange, and of the waste product urea from cells into the blood plasma for excretion in the kidney.			
Describe factors the affect the rate of diffusion.			
Recall that a single-celled organism has a relatively large surface area to volume ratio to allow sufficient transport of molecules into and out of the cell.			
Explain how the small intestine and lungs in mammals, gills in fish, and the roots and leaves in plants, are adapted for exchanging materials.			
List factors that increase the effectiveness of an exchange surface.			
Describe osmosis.			
Recall that active transport moves substances from a more dilute solution to a more concentrated solution (against a concentration gradient). This requires energy from respiration.			
Link the structure of a root hair cell to its function.			
Describe a use for active transport in both plants and animals.			
Explain the difference between diffusion, osmosis and active transport.			
Cell division			
Recall that the nucleus of a cell contains chromosomes made of DNA molecules. Each chromosome carries a large number of genes. In body cells the chromosomes are normally found in pairs.			
Give an overview of mitosis.			

Understand that Cell division by mitosis is important in the growth and development of multicellular organisms.			
Recognise and describe situations where mitosis is occurring.			
Define a stem cell.			
Recall that stem cells from human embryos and adult bone marrow can be cloned and made to differentiate into many different types of human cells.			
Name some conditions which may be helped by treatment with stem cells.			
Discuss the ethical or religious objections and potential risk of stem cell use.			
Recall that stem cells from meristems in plants can be used to produce clones of plants quickly and economically and describe possible uses.			

2 Organisation

Principles of organisation			
Explain organisational hierarchy.			
Define a cell, tissue, organ and organism.			

Animal tissues, organs and organ systems			
Know that digestive system is an example of an organ system in which several organs work together to digest and absorb food.			
Relate knowledge of enzymes to Metabolism.			
Describe the structure function and optimum conditions for enzymes.			
Define denaturation.			
Recall the sites of production and the action of amylase, proteases and lipases.			
Know that digestive enzymes convert food into small soluble molecules that can be absorbed into the bloodstream.			
State that the products of digestion are used to build new carbohydrates, lipids and proteins. Some glucose is used in respiration.			
Recall where bile is made and stored and its pH and function.			
State conditions that increase the rate of fat breakdown by lipase.			
Recall the structure and functioning of the human heart and lungs, including how lungs are adapted for gaseous exchange.			

Organising animals and plants			
Recall that the heart is an organ that blood around the body in a double circulatory system. The right ventricle pumps blood to the lungs where gas exchange takes place. The left ventricle pumps blood around the rest of the body.			
Name the major blood vessels.			
Describe the structure of the lungs.			
Explain natural and artificial pacemakers.			
Name the three different types of blood vessel and explain how the structure of these vessels relates to their functions.			
Describe the components of blood and who they are adapted to function.			

Plant tissues, organs and systems			
Know the function of epidermal tissues palisade mesophyll, spongy mesophyll, xylem and phloem and meristem tissue.			

Describe the structures of tissues in the leaf and relate to their functions.			
Explain how root hair cells are adapted for the efficient uptake of water and mineral ions.			
Know the structure and function of xylem tissue.			
Define factors which affect the rate of transpiration.			
Explain the role of stomata and guard cells.			
Explain the role of phloem tissue and name this process.			

3 Infection and Response

Communicable diseases			
Explain how diseases caused by viruses, bacteria, protists and fungi are spread in animals and plants.			
Define the term pathogen.			
Explain how bacteria and viruses may reproduce in the body and why they make you fell ill.			
Give examples of how the spread of diseases can be reduced.			
Know that Measles is a viral disease and describe the symptoms.			
Explain the effects of HIV and how it is transmitted.			
Describe tobacco mosaic virus (TMV).			
Know that Salmonella food poisoning is spread by bacteria ingested in food, or on food prepared in unhygienic conditions.			
Describe the symptoms of salmonella food poisoning.			
Know how Gonorrhoea is a transmitted and how its spread can be reduced.			
State the cause of Gonorrhoea and describe the symptoms and how it is treated.			
Describe rose black spot and state its cause.			
Know how rose black spot is spread in the environment and how it can be treated.			
Describe malaria and state its cause.			
Know how malaria is spread and how to reduce the spread of the disease.			
Define some of body's natural defences to infection.			
Explain to role of white blood cells.			

Plant disease (biology only)			
Know how plant disease is detected and identified.			
Plants can be infected by a range of viral, bacterial and fungal pathogens as well as by insects.			
Plants can be damaged by a range of ion deficiency conditions:			
Explain plant physical defence responses.			
Explain chemical plant defence responses.			
Explain plant mechanical defence adaptations.			

Preventing and treating disease			
Describe the process of vaccination.			
Explain "herd immunity".			
State what antibiotics can treat and explain the development of antibiotic resistance bacteria.			
Define painkillers.			
Explain why it is difficult to develop drugs that kill viruses.			

Know that traditionally drugs were extracted from plants and microorganisms and give some common examples including who discovered Penicillin and from what.			
State that most new drugs are synthesised by chemists in the pharmaceutical industry. However, the starting point may still be a chemical extracted from a plant.			
For new medicinal drugs explain the stages in preclinical and clinical trial .			
Define placebo.			
Explain double blind trials.			

Monoclonal antibodies (biology only)			
Explain how they are produced.			
Name uses of monoclonal antibodies both diagnostic and therapeutic.			

Non-communicable diseases			
Describe coronary heart disease: a non-communicable disease			
State that health is the state of physical and mental wellbeing.			
Know that defects in the immune system mean that an individual is more likely to suffer from infectious diseases.			
Recall that immune reactions initially caused by a pathogen can trigger allergies such as skin rashes and asthma.			
Know that severe physical ill health can lead to depression and other mental illness.			
Explain the effect of lifestyle on some non-communicable diseases and that they can be caused by and their increased by the interaction of a number of factors,			
Recall that benign tumours and malignant tumours result from uncontrolled cell division. Malignant tumour cells are cancers.			
Know lifestyle risk factors for various types of cancer including smoking, obesity, common viruses and UV exposure. There are also genetic risk factors for some cancers.			

4 Bioenergetics

Photosynthesis			
State the word equation for photosynthesis.			
Write a balanced symbol equation for photosynthesis. **(HT only)**			
Explain where the energy for photosynthesis comes from.			
State the factors that affect the rate of photosynthesis.			
Explain limiting factors. **(HT only)**			
Explain graphs of photosynthesis rate involving two or three factors and decide which is the limiting factor. **(HT only)**			
Understand and use inverse proportion – the inverse square law and light intensity in the context of photosynthesis. **(HT only)**			
Explain how limiting factors are important in the economics of enhancing the conditions in greenhouses to gain the maximum rate of photosynthesis while still maintaining profit. **(HT only)**			
State the six uses of glucose by plants.			
Know how plant use nitrate ions that are absorbed from the soil.			

Respiration			
Compare the processes of aerobic and anaerobic respiration with regard to the need for oxygen, the differing products and the relative amounts of energy transferred.			
Define aerobic and anaerobic respiration.			
State that reactions which transfer energy to the environment are exothermic reactions.			
Name three things organisms need energy for.			
State the word equation for aerobic respiration.			
Write a balanced symbol equation for aerobic respiration. **(HT only)**			
State the word equation for anaerobic respiration in muscles.			
The energy transferred supplies all the energy needed for living processes.			
State the word equation for anaerobic respiration in plant and yeast cells.			
Write a balanced symbol equation for anaerobic respiration in yeast and plant cells. **(HT only)**			
State that anaerobic respiration in yeast cells is called fermentation and has economic importance in the manufacture of bread and alcoholic drinks.			
Explain why anaerobic respiration takes place in muscles during exercise.			
Explain muscle fatigue and oxygen debt.			
Define the role of the liver in the removal of lactic acid. **(HT only)**			
Define metabolism.			
The energy transferred by respiration in cells is used by the organism for the continual enzyme controlled processes of metabolism that synthesise new molecules.			
State five metabolic processes.			

Required Practicals

Required practical activity 1: use a light microscope to observe, draw and label a selection of plant and animal cells. A magnification scale must be included.			
Required practical activity 2: investigate the effect of antiseptics or antibiotics on bacterial growth using agar plates and measuring zones of inhibition.			
Required practical activity 3: investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue.			
Required practical activity 4: use qualitative reagents to test for a range of carbohydrates, lipids and proteins.			
Required practical activity 5: investigate the effect of pH on the rate of reaction of amylase enzyme.			
Required practical activity 6: investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed.			

Mathematical Skills (Paper 1+2)

Arithmetic and Numerical	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.			