OCR Biology B Separate Science Revision Checklist

*Statements in **bold** are for higher tier only.*

Specification Statement	Learning Outcome	✓
B1.1.1	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 to cell functions	
B1.1.1	b) describe how to use a light microscope to observe a variety of plant and animal cells	
B1.1.2	describe the genome as the entire genetic material of an organism	
B1.1.3	describe DNA as a polymer made up of nucleotides, forming two strands in a double helix	
B1.1.4	describe simply how the genome and its interaction with the environment influence the development of the phenotype of an organism, including the idea that most characteristics depend on instructions in the genome and are modified by interaction of the organism with its environment Learners are not expected to describe epigenetic effects	
B1.1.5	explain the terms chromosome, gene, allele, variant, genotype and phenotype	
B1.1.6	explain the importance of amino acids in the synthesis of proteins, including the genome as instructions for the polymerisation of amino acids to make proteins	
B1.1.7	describe DNA as a polymer made from four different nucleotides, each nucleotide consisting of a common sugar and phosphate group with one of four different bases attached to the sugar	
B1.1.8	**explain simply how the sequence of bases in DNA codes for the proteins made in protein synthesis, including the idea that each set of three nucleotides is the code for an amino acid**	
B1.1.9	**recall a simple description of protein synthesis, in which: a copy of a gene is made messenger RNA (mRNA) the mRNA travels to a ribosome in the cytoplasm the ribosome joins amino acids together in an order determined by the mRNA Learners are not expected to recall details of transcription and translation**	
B1.1.10	**recall that all genetic variants arise from mutations**	
B1.1.11	**describe how genetic variants in coding DNA may influence phenotype by altering the activity of a protein**	
B1.1.12	**describe how genetic variants in non-coding DNA may influence phenotype by altering how genes are expressed**	
B1.2.1	explain the terms gamete, homozygous, heterozygous, dominant and recessive	
B1.2.2	explain single gene inheritance, including dominant and recessive alleles and use of genetic diagrams	
B1.2.3	predict the results of single gene crosses	
B1.2.4	use direct proportions and simple ratios in genetic crosses	
B1.2.5	use the concept of probability in predicting the outcome of genetic crosses	
B1.2.6	recall that most phenotypic features are the result of multiple genes rather than single gene inheritance Learners are not expected to describe epistasis and its effects	
B1.2.7	describe the development of our understanding of genetics including the work of Mendel **and the modern-day use of genome sequencing**	
B1.2.8	describe sex determination in humans	
B1.3.1	discuss the potential importance for medicine of our 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 healthcare	

B1.3.2	describe genetic engineering as a process which involves modifying the genome of an organism to introduce desirable characteristics	
B1.3.3	**describe the main steps in the process of genetic engineering including: isolating and replicating the required gene(s) putting the gene(s) into a vector (e.g. a plasmid) using the vector to insert the gene(s) into cells selecting modified cells**	
B1.3.4	explain some of the possible benefits and risks, including practical and ethical considerations, of using gene technology in modern agriculture and medicine	
B2.1.1	describe the relationship between health and disease	
B2.1.2	describe different types of disease (including communicable and non-communicable diseases)	
B2.1.3	explain how communicable diseases (caused by viruses, bacteria, protists and fungi) are spread in animals and plants	
B2.1.4	describe common human infections including influenza (viral), Salmonella (bacterial), Athlete's foot (fungal) and malaria (protist) and sexually transmitted infections in humans including HIV/AIDS (viral)	
B2.1.5	describe plant diseases including tobacco mosaic virus (viral), ash dieback (fungal) and crown gall disease (bacterial)	
B2.2.1	describe non-specific defence systems of the human body against pathogens, including examples of physical, chemical and microbial defences	
B2.2.2	explain how platelets are adapted to their function in the blood	
B2.2.3	describe physical plant defences, including leaf cuticle and cell wall	
B2.2.4	explain the role of the immune system of the human body in defence against disease	
B2.2.5	explain how white blood cells are adapted to their functions in the blood, including what they do and how it helps protect against disease	
B2.2.6	describe chemical plant defence responses, including antimicrobial substances	
B2.3.1	explain how the spread of communicable diseases may be reduced or prevented in animals and plants, to include a minimum of one common human infection, one plant disease and sexually transmitted infections in humans including HIV/AIDS	
B2.3.2	explain the use of vaccines in the prevention of disease, including the use of safe forms of pathogens and the need to vaccinate a large proportion of the population	
B2.4.1	a) describe ways in which diseases, including plant diseases, can be detected and identified, in the lab and in the field	
B2.4.1	b) describe how to use a light microscope to observe microorganisms	
B2.4.2	describe and explain the aseptic techniques used in culturing organisms	
B2.4.3	calculate cross-sectional areas of bacterial cultures and of clear zones around antibiotic discs on agar jelly using	
B2.4.4	**describe how monoclonal antibodies are producing including the following steps: antigen injected into an animal antibody-producing cells taken from animal cells producing the correct antibody selected then cultured**	
B2.4.5	**describe some of the ways in which monoclonal antibodies can be used in diagnostic tests**	
B2.5.1	a) describe how the interaction of genetic and lifestyle factors can increase or decrease the risk of developing non-communicable human diseases, including cardiovascular diseases, many forms of cancer, some lung and liver diseases and diseases influenced by nutrition, including type 2 diabetes	
B2.5.1	b) describe how to practically investigate the effect of exercise on pulse rate and recovery rate	
B2.5.2	use given data to explain the incidence of non-communicable diseases at local, national and global levels with reference to lifestyle factors, including exercise, diet, alcohol and smoking	
B2.5.3	in the context of data related to the causes, spread, effects and treatment of disease: a) translate information between graphical and numerical forms	
B2.5.3	b) construct and interpret frequency tables and diagrams, bar charts and histograms	

B2.5.3	c) understand the principles of sampling as applied to scientific data	
B2.5.3	d) use a scatter diagram to identify a correlation between two variables	
B2.5.4	describe interactions between different types of disease	
B2.6.1	explain the use of medicines, including antibiotics, in the treatment of disease	
B2.6.2	calculate cross-sectional areas of bacterial cultures and of clear zones around antibiotic discs on agar jelly using	
B2.6.3	evaluate some different treatments for cardiovascular disease, including lifestyle changes, medicines and surgery	
B2.6.4	describe the process of discovery and development of potential new medicines including preclinical and clinical testing	
B2.6.5	**describe how monoclonal antibodies can be used to treat cancer including: produce monoclonal antibodies specific to a cancer cell antigen inject the antibodies into the blood the antibodies bind to cancer cells, tagging them for attack by white blood cells the antibodies can also be attached to a radioactive or toxic substance to deliver it to cancer cells**	
B3.1.1	a) describe the process of photosynthesis, including the inputs and outputs of the two main stages and the requirement of light in the first stage, and describe photosynthesis as an endothermic process	
B3.1.1	b) describe practical investigations into the requirements and products of photosynthesis	
B3.1.2	explain how chloroplasts in plant cells are related to photosynthesis	
B3.1.3	a) explain the mechanism of enzyme action including the active site, enzyme specificity and factors affecting the rate of enzyme- catalysed reactions, including substrate concentration, temperature and pH	
B3.1.3	b) describe practical investigations into the effect of substrate concentration, temperature and pH on the rate of enzyme controlled reactions	
B3.1.4	a) explain the effect of temperature, light intensity and carbon dioxide concentration on the rate of photosynthesis	
B3.1.4	b) describe practical investigations into the effect of environmental factors on the rate of photosynthesis	
B3.1.5	**use the inverse square law to explain changes in the rate of photosynthesis with distance from a light source**	
B3.1.6	**explain the interaction of temperature, light intensity and carbon dioxide, concentration in limiting the rate of photosynthesis, and use graphs depicting the effects**	
B3.1.7	in the context of the rate of photosynthesis: a) understand and use simple compound measures such as the rate of a reaction	
B3.1.7	in the context of the rate of photosynthesis: b) translate information between graphical and numerical form	
B3.1.7	in the context of the rate of photosynthesis: c) plot and draw appropriate graphs selecting appropriate scales for axes	
B3.1.7	in the context of the rate of photosynthesis: d) extract and interpret information from graphs, charts and tables	
B3.2.1	describe some of the substances transported into and out of photosynthetic organisms in terms of the requirements of those organisms, including oxygen, carbon dioxide, water and mineral ions	
B3.2.2	a) explain how substances are transported into and out of cells through diffusion, osmosis and active transport Learners are not expected to explain osmosis in terms of water potential	
B3.2.2	b) describe practical investigations into the processes of diffusion and osmosis	
B3.2.3	explain how the partially-permeable cell membranes of plant cells and prokaryotic cells are related to diffusion, osmosis and active transport	
B3.2.4	4. explain how water and mineral ions are taken up by plants, relating to the structure of the root hair cells to their function	

B3.2.5	a) explain how the structure of xylem and phloem are adapted to their functions in the plant	
B3.2.5	b) describe how to use a light microscope to observe the structure of the xylem and phloem	
B3.2.6	a) describe the processes of transpiration and translocation, including the structure and function of the stomata Learners are not expected to describe transpiration in terms of tension or pressure, and are not expected to describe translocation in terms of water potential or hydrostatic pressure	
B3.2.6	b) describe how to use a light microscope to observe the structure of stomata	
B3.2.6	c) describe how to use a simple potometer	
B3.2.7	a) explain the effect of a variety of environmental factors on the rate of water uptake by a plant, to include light intensity, air movement, and temperature	
B3.2.7	b) describe practical investigations into the effect of environmental factors on the rate of water uptake by a plant	
B3.2.8	in the context of water uptake by plants: a) use simple compound measures such as rate	
B3.2.8	in the context of water uptake by plants: b) carry out rate calculations	
B3.2.8	in the context of water uptake by plants: c) plot, draw and interpret appropriate graphs	
B3.2.8	in the context of water uptake by plants: d) calculate percentage gain and loss of mass	
B3.3.1	a) explain the importance of sugars, fatty acids and glycerol, and amino acids in the synthesis and breakdown of carbohydrates, lipids and proteins	
B3.3.1	b) describe the use of qualitative tests for biological molecules	
B3.3.2	describe photosynthetic organisms as the main producers of food and therefore biomass for life on Earth	
B3.3.3	describe some of the substances transported into organisms in terms of the requirements of those organisms, including dissolved food molecules	
B3.3.4	describe different levels of organisation in an ecosystem from individual organisms to the whole ecosystem	
B3.3.5	explain the importance of interdependence and competition in a community	
B3.3.6	describe the differences between the trophic levels of organisms within an ecosystem	
B3.3.7	describe pyramids of biomass and explain, with examples, how biomass is lost between the different trophic levels	
B3.3.8	calculate the efficiency of biomass transfers between trophic levels and explain how this affects the number of organisms at each trophic level	
B3.3.9	recall that many different substances cycle through the abiotic and biotic components of an ecosystem, including carbon and water	
B3.3.10	explain the importance of the carbon cycle and the water cycle to living organisms	
B3.3.11	explain the role of the microorganisms in the cycling of substances through an ecosystem	
B3.3.12	calculate the percentage of mass, in the context of the use and cycling of substances in ecosystems	
B3.3.13	explain the effect of factors such as temperature and water content on rate of decomposition in aerobic and anaerobic environments	
B3.3.14	calculate rate changes in the decay of biological material	
B3.4.1	explain how some abiotic and biotic factors affect communities, including environmental conditions, toxic chemicals, availability of food and other resources, and the presence of predators and pathogens	
B3.4.2	describe how to carry out a field investigation into the distribution and abundance of organisms in an ecosystem and explain how to determine their numbers in a given area	
B3.4.3	in the context of data related to organisms within a population: a) calculate arithmetic means	

B3.4.3	in the context of data related to organisms within a population: b) use fractions and percentages	
B3.4.3	in the context of data related to organisms within a population: c) plot and draw appropriate graphs selecting appropriate scales for the axes	
B3.4.3	in the context of data related to organisms within a population: d) extract and interpret information from charts, graphs and tables	
B4.1.1	compare the processes of aerobic and anaerobic respiration, including conditions under which they occur, the inputs and outputs, and comparative yields of ATP	
B4.1.2	explain why cellular respiration occurs continuously in all living cells	
B4.1.3	explain how mitochondria in eukaryotic cells (plants and animals) are related to cellular respiration	
B4.1.4	describe cellular respiration as an exothermic process	
B4.1.5	a) describe practical investigations into the effect of different substances on the rate of respiration in yeast	
B4.1.5	b) carry out rate calculations for chemical reactions in the context of cellular respiration	
B4.2.1	explain how electron microscopy has increased our understanding of sub-cellular structures	
B4.2.2	in the context of cells and sub-cellar structures: a) demonstrate an understanding of number, size and scale and the quantitative relationship between units	
B4.2.2	in the context of cells and sub-cellar structures: b) use estimations and explain when they should be used	
B4.2.2	**in the context of cells and sub-cellar structures: c) calculate with numbers written in standard form**	
B4.3.1	a) describe the role of the cell cycle in growth, including interphase and mitosis Learners are not expected to recall intermediate phases	
B4.3.1	b) describe how to use a light microscope to observe stages of mitosis	
B4.3.2	describe cancer as the result of changes in cells that lead to uncontrolled growth and division	
B4.3.3	explain the role of meiotic cell division in halving the chromosome number to form gametes, including the stages of interphase and two meiotic divisions Learners are not expected to recall intermediate phases	
B4.3.4	describe the function of stem cells in embryonic and adult animals and meristems in plants	
B4.3.5	explain the importance of cell differentiation, in which cells become specialised by switching genes off and on to form tissues with particular functions	
B4.4.1	a) explain how plant hormones are important in the control and coordination of plant growth and development, with reference to the role of auxins in phototropisms and gravitropisms	
B4.4.1	b) describe practical investigations into the role of auxin in phototropism	
B4.4.2	**describe some of the variety of effects of plant hormones, relating to gibberellins and ethene**	
B4.4.3	**describe some of the different ways in which people use plant hormones to control plant growth**	
B4.5.1	discuss potential benefits, risks and ethical issues associated with the use of stem cells in medicine	
B5.1.1	describe some of the substances transported into and out of the human body in terms of the requirements of cells, including oxygen, carbon dioxide, water, dissolved food molecules and urea	
B5.1.2	explain how the partially-permeable cell membranes of animal cells are related to diffusion, osmosis and active transport	
B5.1.3	describe the human circulatory system, including its relationships with the gaseous exchange system, the digestive system and the excretory system	

B5.1.4	explain how the structure of the heart is adapted to its function, including cardiac muscle, chambers and valves	
B5.1.5	explain how the structure of arteries, veins and capillaries are adapted to their functions, including differences in the vessel walls and the presence of valves	
B5.1.6	explain how red blood cells and plasma are adapted to their functions in the blood	
B5.1.7	explain the need for exchanges surfaces and a transport system in multicellular organisms in terms of surface area:volume ratio	
B5.1.8	calculate surface area:volume ratios	
B5.2.1	explain how the components of the nervous system work together to enable it to function, including sensory receptors, sensory neurons, the CNS, motor neurons and effectors	
B5.2.2	explain how the structure of nerve cells and synapses relate to their functions Learners are not expected to explain nerve impulse transmission in terms of membrane potentials	
B5.2.3	a) explain how the structure of a reflex arc, including the relay neuron, is related to its function	
B5.2.3	b) describe practical investigations into reflex actions	
B5.2.4	describe the structure and function of the brain and roles of the cerebral cortex (intelligence, memory, language and consciousness), cerebellum (conscious movement) and brain stem (regulation of heart and breathing rate)	
B5.2.5	**explain some of the difficulties of investigating brain function**	
B5.3.1	describe the principles of hormonal coordination and control by the human endocrine system	
B5.3.2	**explain the roles of thyroxine and adrenaline in the body, including thyroxine as an example of a negative feedback system**	
B5.4.1	explain the importance of maintaining a constant internal environment in response to internal and external change	
B5.4.2	a) describe the function of the skin in the control of body temperature, including changes to sweating, hair erection and blood flow	
B5.4.2	b) describe practical investigations into temperature control of the body	
B5.4.3	**explain the response of the body to different temperature challenges, including receptors, processing, responses and negative feedback**	
B5.4.4	explain the effect on cells of osmotic changes in body fluids Learners are not expected to discuss water potential	
B5.4.5	describe the function of the kidneys in maintaining the water balance of the body, including filtering water and urea from the blood into kidney tubules then reabsorbing as much water as required	
B5.4.6	**describe the effect of ADH on the permeability of the kidney tubules**	
B5.4.7	**explain the response of the body to different osmotic challenges, including receptors, processing, response and negative feedback**	
B5.4.8	in the context of maintaining a constant internal environment: a) extract and interpret data from graphs, charts and tables	
B5.4.8	in the context of maintaining a constant internal environment: b) translate information between numerical and graphical forms	
B5.5.1	describe the role of hormones in human reproduction, including the control of the menstrual cycle	
B5.5.2	**explain the interactions of FSH, LH, oestrogen and progesterone in the control of the menstrual cycle**	
B5.5.3	explain the use of hormones in contraception and evaluate hormonal and non-hormonal methods of contraception	
B5.5.4	**explain the use of hormones in modern reproductive technologies to treat infertility**	
B5.6.1	explain how insulin controls the blood sugar level in the body	

B5.6.2	**explain how glucagon and insulin work together to control the blood sugar level in the body**	
B5.6.3	compare type 1 and type 2 diabetes and explain how they can be treated	
B5.6.4	a) explain how the main structures of the eye are related to their functions, including the cornea, iris, lens, ciliary muscle and retina and to include the use of ray diagrams	
B5.6.4	b) describe practical investigations into the response of the pupil in different light conditions	
B5.6.5	describe common defects of the eye, including short-sightedness, long-sightedness and cataracts, and explain how these problems may be overcome, including ray diagrams to illustrate the effect of lenses	
B5.6.6	**explain some of the limitations in treating damage and disease in the brain and other parts of the nervous systems**	