

## GCSE BIOLOGY EXAMINATION BOARD COVERAGE

TOPIC	SUB HEADING	KEYWORDS	AQA COMBINED SCIENCE (TRILOGY)	AQA COMBINED SCIENCE (SYNERGY)	AQA BIOLOGY	EDEXCEL COMBINED SCIENCE	EDEXCEL BIOLOGY	OCR GATEWAY COMBINED SCIENCE	OCR GATEWAY BIOLOGY	OCR 21C COMBINED SCIENCE	OCR A 21C BIOLOGY
Cell biology	Cells	Bacterial cell, plasmid, flagella, cell wall. Plant cell, chloroplast, vacuole, cell wall, membrane, mitochondria, cytoplasm, nucleus	4.1.1.1 4.1.1.2 4.1.1.3	4.1.3.2	4.1.1.1 4.1.1.2 4.1.1.3	Topic 1 - Key concepts in biology	Topic 1 - Key concepts in biology	B1.1	B1.1	Throughout	Throughout
Cell biology	The microscope	Microscope, magnification calculations	4.1.1.5	4.1.3.1	4.1.1.5	Topic 1 - Key concepts in biology	Topic 1 - Key concepts in biology	B1.1	B1.1	B1.1 B4.2	B1.1 B4.2
Cell biology	Introduction to working with microbes	Investigating action of disinfectants, Petri dish, loop, media, incubation temperatures			4.1.1.6		Topic 5 – Health, disease and the development of medicines		B6.3		B2.4 B2.6
Cell biology	Cell division - mitosis	Mitosis, cell cycle, genetically identical body cells, growth, repair, asexual reproduction, cloning	4.1.2.1 4.1.2.2	4.1.3.4	4.1.2.1 4.1.2.2	Topic 2 - Cells and control	Topic 2 - Cells and control	B2.1	B2.2	B4.3	B4.3
Cell biology	Stem cells	Adult, embryonic stem cells, unspecialised, potential for treatments, specialisation, meristems and specialisation into plant tissues, treatment of leukaemia and spinal cord injuries	4.1.1.4 4.1.2.3	4.1.3.6 4.2.2.1	4.1.1.4 4.1.2.3	Topic 2 - Cells and control	Topic 2 - Cells and control	B2.1	B2.1	B4.3 B4.4	B4.3 B4.5 B5.6
Cell biology	Growth and development	Increase in size, length, mass, growth data, percentile charts, cell division, elongation, differentiation, growth in plants and animals				Topic 2 - Cells and control	Topic 2 - Cells and control				
Cell biology	Diffusion, osmosis and active transport	Diffusion, rate, oxygen diffusion, active transport, concentration gradient, osmosis, partially permeable membrane, exchange surfaces in organs	4.1.3	4.1.3.3	4.1.3	Topic 1 - Key concepts in biology	Topic 1 - Key concepts in biology	B2.1	B2.1	B3.2	B3.2
Organs and systems	Cells, tissues, organs and organ systems	Cell differentiation in multicellular animals, tissues (muscle, gland, epithelia), organs (stomach), systems (digestive system components). Plant tissues (epidermis, mesophyll, xylem and phloem) and organs parts (mouth oesophagus, stomach, small and large intestines, pancreas, liver, gall bladder), peristalsis, carbohydrases, proteases, lipases, role of bile, villi, enzyme experiments	4.2.1 4.3.2.1	4.2.1.2 (part) 4.2.2.2	4.2.1 4.3.2.1	Topic 1 - Key concepts in biology	Topic 1 - Key concepts in biology	B1.2	B1.2		
Organs and systems	Digestive system and digestive enzymes		4.2.2.1	4.2.1.5	4.2.2.1						

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Organs and systems	Enzymes	Biological catalyst, enzymes in DNA replication, protein synthesis and digestion, factors influencing enzymes (temp, substrate conc., pH), specificity, lock and key hypothesis, denaturation, enzyme	4.2.2.1	4.7.4.7	4.2.2.1	Topic 1 - Key concepts in biology	Topic 1 - Key concepts in biology	B1.2	B1.2	B3.1	B3,1
Organs and systems	Gas exchange in the lungs	Lungs, thorax, ribcage, diaphragm, trachea, bronchi, alveoli, capillary network, gas exchange, breathing, diffusion	4.2.2.2	4.2.1.1 4.2.1.3	4.2.2.2	Topic 8 - Exchange and transport in animals	Topic 8 - Exchange and transport in animals	B2.2	B2.2		
Organs and systems	Blood and circulatory system	Blood (red, white cells, plasma, platelets), structure of the heart and function (named blood vessels and pumping chambers), valves and blood flow. Circulatory system (arteries, veins, capillaries)	4.2.2.2 4.2.2.3	4.2.1.3 4.2.1.4	4.2.2.2 4.2.2.3	Topic 8 - Exchange and transport in animals	Topic 8 - Exchange and transport in animals	B2.2	B2.2	B5.1	B5.1
Organs and systems	Transpiration and plant transport	Transpiration, transport of water, glucose and minerals, active transport, xylem and phloem, root hair cells	4.2.3.2	4.2.2.3 4.2.2.7	4.2.3.2	Topic 6 - Plant structures and their functions	Topic 6 - Plant structures and their functions	B2.2	B2.2	B3.2	B3.2
Disease	Diet	Human health and diet, obesity, BMI calculations, deficiency disease	4.2.2.6	4.3.1.2	4.2.2.6	Topic 5 – Health, disease and the development of medicines	Topic 5 – Health, disease and the development of medicines	B6.3	B6.3	B2.4	B2.5
Disease	Heart disease	Fatty deposits, heart attack, lifestyle (diet, stress, smoking, drugs) and genetic factors, exercise, comparing incidence in different countries, epidemiology, assessing levels of risk, blood pressure and heart	4.2.2.4 4.2.2.5	4.3.1.1 4.3.1.3	4.2.2.4 4.2.2.5	Topic 5 – Health, disease and the development of medicines	Topic 5 – Health, disease and the development of medicines	B6.3	B6.3	B2.1 B2.4 B2.5	B2.1 B2.5 B2.6
Disease	Alcohol, cigarettes and health	Nicotine, tar, carcinogen, carbon monoxide, interpreting data, smoking and health issues, alcohol abuse, liver cirrhosis	4.2.2.6	4.3.1.2	4.2.2.6	Topic 5 – Health, disease and the development of medicines	Topic 5 – Health, disease and the development of medicines	B6.3	B6.3	B2.1	B2.1
Disease	Pathogens and the body's defences against disease	Pathogens, infectious disease, examples of methods of transmission with examples including water, food, airborne contact, body fluids, vectors. Physical defences - skin, cilia, mucus, chemical - stomach acid, lysozyme	4.3.1.1 - 4.3.1.6	4.3.3.1 4.3.3.2 4.3.3.3	4.3.1.1 - 4.3.1.6	Topic 5 – Health, disease and the development of medicines	Topic 5 – Health, disease and the development of medicines	B6.3	B6.3	B2.1 B2.3	B2.1 B2.3
Disease	Harmful microbes, vaccination and immunity	Experiments with microbes using resazurin, vaccination, pathogen, antigen, immune response, antibodies, memory lymphocytes, advantages and risks of immunisation, plant defences and impact of plant pests on food supply	4.3.1.6 4.3.1.7	4.2.2.8 4.3.3.4 4.3.3.5	4.3.1.6 4.3.1.7 4.3.2 4.3.3	Topic 5 – Health, disease and the development of medicines	Topic 5 – Health, disease and the development of medicines	B6.3	B6.3	B2.2 B2.3	B2.2 B2.4 B2.6
Disease	Antimicrobial agents and microbial resistance	Antibiotics, penicillin, resistant strains, new antibiotics, MRSA, natural selection, over-use, mutation of pathogens	4.3.1.8 4.6.3.4	4.3.3.6	4.3.1.8 4.6.3.7	Topic 5 – Health, disease and the development of medicines	Topic 5 – Health, disease and the development of medicines	B6.3	B6.3	B2.5	B2.6

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Disease	Developing new drugs	Testing new drugs and vaccines for safety and effectiveness, using animals, using animal cells, human trials, open label blind and double blind, long term trials, ethical issues of placebos	4.3.1.9	4.3.3.7	4.3.1.9	Topic 5 – Health, disease and the development of medicines	Topic 5 – Health, disease and the development of medicines	B6.3	B6.3	B2.5	B2.6
Bioenergetics	The leaf and photosynthesis	Structure of the leaf, chlorophyll, chloroplast, stomata. Photosynthesis, word equation, limiting factors (light, CO <sub>2</sub> , temp) - experiments	4.2.3.1 4.4.1	4.2.2.5 4.2.2.6	4.2.3.1 4.4.1	Topic 6 - Plant structures and their functions	Topic 6 - Plant structures and their functions	B1.4	B1.4	B3.1	B3.1
Bioenergetics	Aerobic and anaerobic respiration	Respiration, role of circulatory system, capillaries, diffusion of oxygen, carbon dioxide and glucose, word equation, anaerobic respiration and word equation, lactic acid, EPOC	4.4.2.1	4.2.1.1	4.4.2.1	Topic 8 - Exchange and transport in animals	Topic 8 - Exchange and transport in animals	B1.3	B1.3	B4.1	B4.1
Bioenergetics	Effect of exercise on the body	Heart rate and breathing rate during exercise, cardiac output equation, EPOC	4.4.2.2	4.2.1.1	4.4.2.2	Topic 8 - Exchange and transport in animals	Topic 8 - Exchange and transport in animals	B1.3 B6.3	B1.3 B6.3	B2.4	B2.4
Homeostasis	Homeostasis - balancing the internal environment	Homeostasis, thermoregulation, osmoregulation, blood glucose	4.5.1	4.3.1.4	4.5.1	Topic 7 - Animal coordination, control and homeostasis	Topic 7 - Animal coordination, control and homeostasis	B3.3	B3,3	B5.4	B5.4
Homeostasis	Thermoregulation - balancing heat gain and loss	Thermoregulation, skin, sweat, blood vessels, hair. Vasoconstriction, vasodilation, negative feedback			4.5.2.4		Topic 7 - Animal coordination, control and homeostasis		B3,3		B5.4
The human nervous system	The nervous system	Nervous system, brain, spinal cord, sense organs, nerves, neurons, receptors	4.5.2	4.2.1.6	4.5.2.1	Topic 2 - Cells and control	Topic 2 - Cells and control	B3.1	B3.1	B5.2	B5.2

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The human nervous system	The reflex arc	Sensory, relay, motor neurone, synapse, myelin, neurotransmitter, reflex arc	4.5.2	4.2.1.6	4.5.2.1	Topic 2 - Cells and control	Topic 2 - Cells and control	B3.1	B3.1	B5.2	B5.2
The human nervous system	The synapse	Synapse	4.5.2	4.2.1.6	4.5.2.1	Topic 2 - Cells and control	Topic 2 - Cells and control	B3.1	B3.1	B5.2	B5.2
The human nervous system	The brain and mind	Cerebral cortex, intelligence, memory, language, consciousness, brain mapping (brain damage, electrical stimulation, MRI)			4.5.2.2		Topic 2 - Cells and control		B3.1		B5.2
The human nervous system	The eye and vision	Parts of the eye, monocular/binocular vision, short-sight, long-sight, colour blindness, accommodation			4.5.2.3		Topic 2 - Cells and control		B3.1		B5.6
Hormonal coordination	Hormones in our bodies	Hormones, endocrine gland	4.5.3.1	4.2.1.7	4.5.3.1	Topic 7 - Animal coordination, control and homeostasis	Topic 7 - Animal coordination, control and homeostasis	B3.2	B3.2	B5.3	B5.3
Hormonal coordination	Controlling blood sugar level and diabetes	Blood sugar level, processed foods, type 1 diabetes - pancreas, insulin, injections, type 2 - late onset, diet and exercise, interpret data - unhealthy lifestyles	4.5.3.2	4.3.1.5	4.5.3.2	Topic 7 - Animal coordination, control and homeostasis	Topic 7 - Animal coordination, control and homeostasis	B3.3	B3,3	B5.6	B5.6
Hormonal coordination	The kidney and water balance	Waste products, urea, urinary system (renal artery, vein, kidney, ureters, bladder, urethra), dialysis, organ donation, nephron (glomerulus, Bowman's capsule, convoluted tubules, loop of Henle, collecting duct, urine formation and osmoregulation, ADH, pituitary gland, osmotic feedback)			4.5.3.3		Topic 7 - Animal coordination, control and homeostasis		B3.3		B5.4

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Hormonal coordination	Hormone control of the menstrual cycle	Hormonal control of the menstrual cycle by oestrogen, progesterone, FSH, LH, negative feedback	4.5.3.3	4.3.1.6	4.5.3.4	Topic 7 - Animal coordination, control and homeostasis	Topic 7 - Animal coordination, control and homeostasis	B3.2	B3.2	B5.5	B5.5
Hormonal coordination	Controlling fertility	Infertility treatments (egg donation, IVF, surrogate mothers, hormones), contraception	4.5.3.4 4.5.3.5	4.3.1.7 4.3.1.8	4.5.3.5 4.5.3.6	Topic 7 - Animal coordination, control and homeostasis	Topic 7 - Animal coordination, control and homeostasis	B3.2	B3.2	B5.5	B5.5
Hormonal coordination	Tropisms - hormone control of plant growth	Plant hormones, phototropism, geotropism, auxin, cell elongation, interpret experiments, gibberellins			4.5.4.1		Topic 6 - Plant structures and their functions		B3.2		B4.4
Hormonal coordination	Uses of plant hormones	Weed killer, rooting powder, seedless fruit, ripening			4.5.4.2		Topic 6 - Plant structures and their functions		B3.2		B4.4
Inheritance	Cell division - meiosis	Meiosis and fertilisation - genetically different haploid gametes, fertilisation, diploid zygote	4.6.1.2	4.1.3.5	4.6.1.2	Topic 3 - Genetics	Topic 3 - Genetics	B5.1	B5.1	B4.3	B4.3
Inheritance	DNA, genes and the genetic code	Gene, DNA, coding, double strand, double helix, ATCG, DNA extraction, structure, Watson, Crick, Franklin, Wilkins, human genome, collaboration	4.6.1.3	4.4.3.1	4.6.1.4 4.6.1.5	Topic 3 - Genetics	Topic 3 - Genetics	B1.2	B1.2	B1.1	B1.1
Inheritance	Proteins	Proteins, sequence of amino acids, molecule shape		4.4.4.1	4.6.1.5		Topic 3 - Genetics		B1.2 B5.1	B1.1	B1.1

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Inheritance	How proteins are made	Stages in protein synthesis, transcription, translation, mRNA, ribosomes, codons, amino acids, polypeptide			4.6.1.5		Topic 3 - Genetics		B1.2		B1.1
Inheritance	Genes and inheritance	Dominant, recessive, homozygous, heterozygous, phenotype, genotype, monohybrid cross, genetic diagram, Punnett square, pedigree, analyse outcomes	4.6.1.4 4.6.1.6	4.4.3.2 4.4.3.3	4.6.1.6 4.6.1.8 4.6.3.3	Topic 3 - Genetics	Topic 3 - Genetics	B5.1	B5.1	B1.2	B1.2
Inheritance	Genetic disorders and genetic diagrams	Cystic fibrosis, sickle cell, monohybrid cross, genetic diagram, Punnett square, pedigree, analyse outcomes	4.6.1.5		4.6.1.7	Topic 3 - Genetics	Topic 3 - Genetics			B1.3	B1.3
Variation and evolution	Variation and inherited characteristics	Chromosomes, genes, alleles, inherited characteristics. Continuous, discontinuous, normal distribution, causes of variation	4.6.2.1	4.4.3.1 4.4.3.4	4.6.2.1	Topic 3 - Genetics	Topic 3 - Genetics	B5.1	B5.1	B1.1	B1.1
Variation and evolution	Sex determination and sex-linked genetic disorders	Sex determination (including genetic diagram), sex-linked genetic disorders (haemophilia, colour blindness)					Topic 3 - Genetics				
Variation and evolution	Evolution by natural selection	Darwin, evolution, natural selection, variation, over-production, struggle, survival, inheritance, change, validation of evidence	4.6.2.2 4.6.3.1	4.4.4.2 4.4.4.3	4.6.2.2 4.6.3.1 4.6.3.4	Topic 4 - Natural selection and genetic modification	Topic 4 - Natural selection and genetic modification	B5.2	B5.2	B6.1	B6.1
Variation and evolution	Speciation	Speciation, geographical isolation			4.6.3.2					B6.1	B6.1

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Variation and evolution	Human evolution	Evidence for human evolution - fossils (Ardi, Lucy, Leakey's discovery), stone tools. Mitochondrial DNA, African Eve, tracking human migration and evolution, impact of climate change on human behaviour				Topic 4 - Natural selection and genetic modification	Topic 4 - Natural selection and genetic modification				
Variation and evolution	Genetic modification	Removal and insertion of genes, advantages of GM organisms (Vit A in rice, human insulin, herbicide resistance)	4.6.2.4	4.3.3.8	4.6.2.4	Topic 4 - Natural selection and genetic modification	Topic 4 - Natural selection and genetic modification	B6.2	B6.2	B1.3	B1.3
Variation and evolution	Genetic engineering	Recombinant DNA technology (insulin, restriction enzymes, ligase, sticky ends), introducing insect resistance from Bacillus thuringiensis into crops	4.6.2.4	4.4.4.6	4.6.2.4	Topic 4 - Natural selection and genetic modification	Topic 4 - Natural selection and genetic modification	B6.2	B6.2	B1.3	B1.3
Variation and evolution	Cloning	Asexual reproduction, natural clones (bulbs, runners), identical twins, nuclear transfer. Plant cuttings, meristems, rooting hormone, mammalian cloning, reactivation of genes	4.6.1.1		4.6.1.1 4.6.1.3 4.6.2.5	Topic 3 - Genetics	Topic 3 - Genetics		B5.1		B6.2
Variation and evolution	Fossil evidence for evolution	Evidence for evolution, fossil record, pentadactyl limb	4.6.3.2	4.4.4.3	4.6.3.5	Topic 4 - Natural selection and genetic modification	Topic 4 - Natural selection and genetic modification	B5.2	B5.2	B6.1	B6.1
Variation and evolution	Classification	Classification, the Five Kingdoms, viruses. Chordates, vertebrates. Species, variation, keys, binomial, conservation, hybridisation, ring species	4.6.4	4.4.4.4	4.6.4	Topic 4 - Natural selection and genetic modification	Topic 4 - Natural selection and genetic modification	B5.2	B5.2	B6.2	B6.3
Ecology	Adaptations to the environment	Survival, competition, helpful adaptations, extremophiles, desert and arctic survival, plant adaptations to dry conditions	4.7.1.4		4.7.1.4	Topic 9 - Ecosystems and material cycles	Topic 9 - Ecosystems and material cycles	B4.1	B4.1		

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Ecology	Parasitism and mutualistic feeding relationships	Parasitism (fleas, lice, tapeworm, mistletoe) mutualism				Topic 9 - Ecosystems and material cycles	Topic 9 - Ecosystems and material cycles				
Ecology	Fieldwork techniques in biology	Fieldwork sampling techniques, (pooters, nets, traps, quadrats), measure environmental factors,keys	4.7.1.1 4.7.1.2 4.7.1.3	4.4.2.3 4.4.2.4	4.7.1.1 4.7.1.2 4.7.1.3 4.7.2.1	Topic 9 - Ecosystems and material cycles	Topic 9 - Ecosystems and material cycles	B4.1 B6.1	B4.1 B6.1	B3.4	B3.4
Ecology	Energy and biomass in food chains	Interdependence, food chain, trophic levels, pyramid of biomass, chemosynthesis	4.7.2.1	4.4.2.1 4.4.2.2	4.7.2.1 4.7.4.1 - 4.7.4.3	Topic 9 - Ecosystems and material cycles	Topic 9 - Ecosystems and material cycles	B4.1	B4.1	B3.3	B3.3
Ecology	The carbon and water cycles	Carbon cycle, photosynthesis, respiration, decomposer, combustion, fossil fuel, water cycle	4.7.2.2	4.4.1.2 4.4.1.7	4.7.2.2	Topic 9 - Ecosystems and material cycles	Topic 9 - Ecosystems and material cycles	B4.1	B4.1	B3.3	B3.3
Ecology	The nitrogen cycle	Nitrogen fixation, root nodules, lightning, decomposers, protein, urea, ammonia, nitrifying bacteria, nitrates, denitrifying bacteria				Topic 9 - Ecosystems and material cycles	Topic 9 - Ecosystems and material cycles				
Human impact on the environment	Human impact on biodiversity	Biodiversity (different species, range of organisms, genetic variation), importance for food crops and medicines, rate of extinction, maintaining biodiversity and sustainability, silting, desertification	4.6.3.3 4.7.3.1 4.7.3.6	4.4.2.5 4.4.2.7	4.6.3.6 4.7.3.1 4.7.3.6	Topic 9 - Ecosystems and material cycles	Topic 9 - Ecosystems and material cycles	B6.1	B6.1	B6.3	B6.4
Human impact on the environment	Pollution and environmental change	Changes to environment and impact on distribution, living and non-living factors, lichen and invertebrates as pollution indicators, measuring non-living indicators. Population change, pollutants, reduction in land	4.7.3.2 - 4.7.3.5	4.4.1.4 4.4.2.6	4.7.2.4 4.7.3.2 - 4.7.3.5	Topic 9 - Ecosystems and material cycles	Topic 9 - Ecosystems and material cycles	B6.1	B6.1	B6.3	B6.4
Human impact on the environment	Farming	Hydroponics, fertilisers, organic farming, biological control					Topic 4 - Natural selection and genetic modification				

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Human impact on the environment	Food security	Efficiency of food production, declining fish stocks, net sizes, quotas, selective breeding	4.6.2.3	4.4.4.5	4.6.2.3 4.7.5	Topic 4 - Natural selection and genetic modification	Topic 4 - Natural selection and genetic modification		B6.2	B6.1	B6.1 B6.4