Year 11 Science GCSE Revision – BIOLOGY (PAPER 1)

Biology only content is the extra work that **separate science** students have studied

All support resources (specimen exam papers, mark schemes, powerpoints, summary sheets, core practicals) can be found on the reference drive at **N:\Reference\Science\NEW AQA GCSE**

Revision should be checked against syllabus content (different for TRIOLOGY and separate BIOLOGY) at **N:\Reference\Science\NEW AQA GCSE\syllabus content (Biology)**

Make sure you **revise the required practicals** properly. These are more likely to come up on the examination papers

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Week Beginning	Topic	Key Ideas	Topics for possible longer answer responses
Week 1 3rd March	B1 Cell Biology	Cell Structure – Eukaryotes and Prokaryotes Animal and plant cells Cell Specialisation Cell Differentiation Microscopy Cell Division – mitosis Stem cells Transport in cells – Diffusion Osmosis Active transport	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. $\text{magnification} = \frac{\text{size of image}}{\text{size of real object}}$ Required practical activity 3: investigate the effect of a range of concentrations of salt or sugar solutions on the mass of plant tissue The results in show the percentage change in mass of the potato cylinders. Explain why the percentage change results are positive and negative. Evaluate the use of stem cells from embryos or from adult bone marrow for treating human diseases. *Use specimen papers and summary sheets on the reference drive for more ideas*
Biology only content		Culturing microorganisms	Required practical activity 2: investigate the effect of antiseptics or antibiotics on bacterial growth using agar plates and measuring zones of inhibition. Calculate the zone of inhibition using πr^2. **Calculate the number of organisms in a particular time in standard form (HT)**

Week 2 **10th March** **+** **Week 3** **17th March**	B2 organisation	Cells, tissues and organs Human digestive system Enzymes and their role in the digestive system. Food tests Protease, carbohydrase, lipase and amylase. The effect of pH and temperature on enzyme activity Heart and blood vessels Heart and Lung structure- ventricles, atrium, vena cava, pulmonary artery, pulmonary vein and aorta, role of blood capillaries around the alveoli. Blood vessels- veins, arteries and capillaries Blood – red blood cells, white blood cells, platelets and plasma Coronary heart disease Use of stents, statins for blocked arteries Faulty valves Heart transplants Non communicable diseases Risk factors including diet, alcohol and smoking Cancer Benign and malignant tumours Plant tissues Stomata Xylem vessels – transpiration Phloem - translocation	<u>Required practical activity 4:</u> use qualitative reagents to test for a range of carbohydrates, lipids and proteins. To include: Benedict's test for sugars; iodine test for starch; and Biuret reagent for protein. <u>Required practical activity 5:</u> investigate the effect of pH on the rate of reaction of amylase enzyme. Explain how the human circulatory system is adapted to: supply oxygen to the tissues; remove waste products from tissues. Explain how and why the three different blood vessels differ in structure and function Describe how you would use the apparatus to find the best temperature for removing stains from clothing. You should include how you would make the investigation a fair test. (enzyme question) Describe how the student could investigate the effect of pH on the breakdown of starch by amylase. Evaluate the advantages and disadvantages of treating cardiovascular diseases by drugs, mechanical devices or transplants. Marram grass are found in sand dunes Explain how having sunken stomata will affect gaseous exchange in the plant, and why this could be an advantage to the plant *Use specimen papers and summary sheets on the reference drive for more ideas*
Biology content only		No extra content	
Week 4 **24th March**	B3 Infection and disease	Communicable diseases Pathogen Modes of transport of pathogens Ways to prevent spread Viruses Measles, HIV and tobacco mosaic virus (TMV)	Explain what testing must be done before a new drug can be used to treat people. Explain how the HPV vaccine could reduce the incidence of cancer.

		Bacteria Salmonella and gonorrhoea Fungi Rose black spot Protist Malaria Human defence system Skin, nose, trachea, bronchi and stomach. White blood cells- phagocytosis Production of antitoxins, antibodies Vaccinations Inactive form of pathogen, inserted into humans to trigger antibody production antibiotics and painkillers Specificity of antibiotics and that they don't kill viruses. Painkillers only affect the symptoms not the pathogens development of drugs clinical trials	Tobacco Mosaic Virus affects plants. Plants infected with TMV are often smaller than healthy plants. Explain why. Explain how the body defends itself against infection by salmonella once it has been ingested via contaminated food *Use specimen papers and summary sheets on the reference drive for more ideas*
Biology only content (HT)		**Monoclonal antibodies – production and uses**	
Biology only		Plant disease – detection and identification. Plant defences	
Week 5 31st March	B4 Bioenergetics	**Photosynthesis** carbon dioxide + water $\xrightarrow{\text{light}}$ glucose + oxygen Calculate the rate of photosynthesis **(HT only) factors that limits photosynthesis.** **(HT only) Explain graphs of photosynthesis rate involving two or three factors and decide which is the limiting factor.** **(HT only) calculate the inverse square law and light intensity in the context of photosynthesis.** **(HT only) Limiting factors are important in the economics of enhancing the conditions in greenhouses to gain the maximum rate of photosynthesis while still maintaining profit** Uses of glucose from photosynthesis	<u>Required practical activity 6:</u> investigate the effect of light intensity on the rate of photosynthesis using an aquatic organism such as pondweed. Suggest factors that may limit the rate of photosynthesis Compare anaerobic respiration in a yeast cell with anaerobic respiration in a muscle cell. Describe four ways that plants use glucose. Explain oxygen debt *Use specimen papers and summary sheets on the reference drive for more ideas*

		Storage, respiration, proteins and cellulose. Respiration Aerobic respiration glucose + oxygen → carbon dioxide + water Anaerobic Respiration glucose → lactic acid Anaerobic respiration in plants glucose → ethanol + carbon dioxide Response to exercise **(HT only) Blood flowing through the muscles transports the lactic acid to the liver where it is converted back into glucose.** Metabolism Importance of sugars, amino acids, fatty acids and glycerol in the synthesis and breakdown of carbohydrates, proteins and lipids.	
Biology only content		No extra content	

Year 11 Science GCSE Revision – BIOLOGY (PAPER 2)

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Week 6 7th April **+** **Week 7 14th April**	B5 Homeostasis	Nervous system stimulus → receptor → coordinator → effector → response Reflex arc - automatic and rapid Endocrine system Role of: pituitary gland, pancreas, thyroid, adrenal gland, ovary, testes. Controlling blood glucose Insulin and glucogen Type I diabetes Type 2 diabetes **(HT only) If the blood glucose concentration is too low, the pancreas produces the hormone glucagon that causes glycogen to be converted into glucose and released into the blood.** **(HT only) explain how glucagon interacts with insulin in a negative feedback cycle to control blood glucose (sugar) levels in the body.** Hormones and human reproduction Menstrual cycle (FSH) and (LH) Puberty Oestrogen Testosterone **(HT only) Students should be able to explain the interactions of FSH, oestrogen, LH and progesterone, in the control of the menstrual cycle.** **(HT only) Students should be able to extract and interpret data from graphs showing hormone levels during the menstrual cycle.**	<u>Required practical activity 7:</u> plan and carry out an investigation into the effect of a factor on human reaction time. Explain how hormonal and non-hormonal methods of contraception prevent pregnancy occurring Explain what would happen to maintain blood glucose concentration if someone ate some glucose tablets Explain how blood glucose levels are controlled in the body of someone who does not have diabetes. Compare how each type of diabetes is caused. Suggest how each type of diabetes can be treated. Explain why missing a dose of the mini-pill would reduce the success rate of the mini-pill. *Use specimen papers and summary sheets on the reference drive for more ideas*

		Contraception Hormonal and non-hormonal oral contraceptives that contain hormones to inhibit FSH production so that no eggs mature injection, implant or skin patch of slow-release progesterone to inhibit the maturation and release of eggs for a number of months or years barrier methods such as condoms and diaphragms which prevent the sperm reaching an egg intrauterine devices which prevent the implantation of an embryo or release a hormone spermicidal agents which kill or disable sperm abstaining from intercourse when an egg may be in the oviduct surgical methods of male and female sterilisation **(HT only) use of hormones to treat infertility FSH and LH and IVF treatment** **(HT only) negative feedback -Thyroxine and adrenaline**	
Biology only content		The Brain - cerebral cortex, cerebellum and medulla **(HT only) explain some of the difficulties of investigating brain function and treating brain damage and disease.** **(HT only) Neuroscientists have been able to map the regions of the brain to particular functions by studying patients with brain damage, electrically stimulating different parts of the brain and using MRI scanning techniques** The eye Role of retina, optic nerve, sclera, cornea, iris, ciliary muscles, suspensory ligaments Focus and Adaptation to dim light Control of body temperature Vasodilation and vasoconstriction (**HT only) explain how these mechanisms lower or raise body temperature in a given context.** Maintaining water and nitrogen balance in the body Function of the kidneys and the urinary system	<u>Required practical activity 8:</u> investigate the effect of light or gravity on the growth of newly germinated seedlings.

		(HT only) The digestion of proteins from the diet results in excess amino acids which need to be excreted safely. In the liver these amino acids are deaminated to form ammonia. Ammonia is toxic and so it is immediately converted to urea for safe excretion **(HT only) Students should be able to describe the effect of ADH on the permeability of the kidney tubules.** **(HT only) The water level in the body is controlled by the hormone ADH which acts on the kidney tubules. ADH is released by the pituitary gland when the blood is too concentrated and it causes more water to be reabsorbed back into the blood from the kidney tubules. This is controlled by negative feedback.** Plant hormones Auxin – phototropism, geotropism **(HT only) Gibberellins are important in initiating seed germination.** **(HT only) Ethene controls cell division and ripening of fruits.** **(HT only) use of plant hormones** **Auxin ethane and giberrelins**	
Week 8 **21st April** **+** **Week 9** **28th April**	B6 inheritance , variation and Evolution	Sexual and asexual reproduction Meiosis Genetic inheritance Gamete, chromosome, gene, allele, dominant, recessive, homozygous, heterozygous genotype, phenotype. Construct punnett square and calculate genetic ratios **(HT only) Students should be able to construct a genetic cross by Punnett square diagram and use it to make predictions using the theory of probability** Inherited disorders Polydactyl and cystic fibrosis Sex determination XX and XY Variation Genetic, environmental or both Evolution natural selection	Explain how a cat has been produced using selective breeding In parts of Africa, aeroplanes have been used to spray insecticide on crops, to kill the worms. Explain the advantages and disadvantages of spraying insecticide on the corn crops. *Use specimen papers and summary sheets on the reference drive for more ideas*

		Selective breeding resistant crops, better produce Genetic engineering – insulin **(HT only) describe the main steps in the process of genetic engineering.** Evidence of evolution –fossils and antibiotic resistant bacteria Classification of living organisms – Linnaean system	
Biology only content		Advantages and disadvantages of sexual and asexual reproduction DNA structure **(HT only) • recall a simple description of protein synthesis** **• explain simply how the structure of DNA affects the protein made** **• describe how genetic variants may influence phenotype: a) in coding DNA by altering the activity of a protein: and b) in non-coding DNA by altering how genes are expressed.** **(HT only) In the complementary strands a C is always linked to a G on the opposite strand and a T to an A.** **(HT only) Students are not expected to know or understand the structure of mRNA, tRNA, or the detailed structure of amino acids or proteins.** **(HT only) Students should be able to explain how a change in DNA structure may result in a change in the protein synthesised by a gene.** **(HT only) Proteins are synthesised on ribosomes, according to a template. Carrier molecules bring specific amino acids to add to the growing protein chain in the correct order.** **(HT only) When the protein chain is complete it folds up to form a unique shape. This unique shape enables the proteins to do their job as enzymes, hormones or forming structures in the body such as collagen.** **(HT only) Mutations occur continuously. Most do not alter the protein, or only alter it slightly so that its appearance or function is not changed.**	Explain how a mutation could cause an enzyme not to work Explain how several different species of camel could have evolved from a common ancestor over 45 million years.

		(HT only) A few mutations code for an altered protein with a different shape. An enzyme may no longer fit the substrate binding site or a structural protein may lose its strength. **(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.** Cloning –tissue culture, cuttings, embryo transplants adult cell cloning Theory of evolution Charles Darwin - natural selection Jean-Baptiste Lamarck Speciation Wallace and Darwin Describe the steps that give rise to a new species Genetics – Gregor Mendel	
Week 10 **5th May**	B7 Ecology	Adaptation interdependence and competition Biotic and abiotic factors Adaptations of organisms Organisation of an ecosystem Food chains and food webs How materials are recycled Carbon cycle Biodiversity Waste management- pollution in the air land and water Land use Deforestation Global warming Maintaining biodiversity	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. Some animals are adapted to survive in very cold conditions such as the Arctic. Explain how the adaptations of Arctic animals help them to survive in cold conditions. Explain how carbon is recycled into the growth of new leaves *Use specimen papers and summary sheets on the reference drive for more ideas*
Biology only content		(Biology only) Decomposition Temperature, water and availability of oxygen affect the rate of decay of biological material. **(HT only and Biology) impact of environmental change** (Biology only) Trophic levels in an ecosystem Pyramids of biomass Transfer of biomass	Required practical activity 10: investigate the effect of temperature on the rate of decay of fresh milk by measuring pH change. 'The higher the temperature the faster the growth of mould' Describe how you would test the hypothesis

	Calculate the efficiency of biomass transfers between trophic levels by percentages or fractions of mass. (Biology only) Food production Factors affecting food security Environmental, cost, sustainability, conflict, pests and pathogens. Farming techniques Sustainable fisheries Role of biotechnology	The bacteria are decomposers. Bacteria change organic matter into carbon dioxide and inorganic mineral ions. Describe how the bacteria do this. Explain how intensive farming of pigs increases the efficiency of food production