What makes an A/A* in AQA Biology

	Topic	What to learn
B1	a. Antibiotic resistance	■ *antibiotics kill individual pathogens of the non-resistant strain* ■ *individual resistant pathogens survive and reproduce, so the population of the resistant strain increases* ■ *now, antibiotics are not used to treat non-serious infections, such as mild throat infections, so that the rate of development of resistant strains is slowed down.*
B2	b. Anaerobic respiration and oxygen debt	*As the breakdown of glucose is incomplete, much less energy is released than during aerobic respiration. Anaerobic respiration results in an oxygen debt that has to be repaid in order to oxidise lactic acid to carbon dioxide and water.*
	c. Construction of genetic diagrams, use of terms	*construct genetic diagrams of monohybrid crosses and predict the outcomes of monohybrid crosses and be able to use the terms homozygous, heterozygous, phenotype and genotype*
	d. Meiosis	*When a cell divides to form gametes:* ■ *copies of the genetic information are made* ■ *then the cell divides twice to form four gametes, each with a single set of chromosomes.*
	e. Making proteins	*Each gene codes for a particular combination of amino acids which make a specific protein.*
	f. Speciation	*New species arise as a result of:* ■ *isolation – two populations of a species become separated, eg geographically* ■ *genetic variation – each population has a wide range of alleles that control their characteristics* ■ *natural selection – in each population, the alleles that control the characteristics which help the organism to survive are selected* ■ *speciation – the populations become so different that successful interbreeding is no longer possible.*
B3	a. Vasodilation/ vasoconstriction	*If the core body temperature is too high:* ■ *blood vessels supplying the skin capillaries dilate so that more blood flows through the capillaries and more heat is lost* *If the core body temperature is too low:* ■ *blood vessels supplying the skin capillaries constrict to reduce the flow of blood through the capillaries*
	b. Sweating/shivering	*If the core body temperature is too high* ■ *sweat glands release more sweat which cools the body as it evaporates.* *If the core body temperature is too low:* ■ *muscles may 'shiver' – their contraction needs respiration, which releases some energy to warm the body.*
	c. Glucagon	*A second hormone, glucagon, is produced in the pancreas when blood glucose levels fall. This causes glycogen to be converted into glucose and be released into the blood.*

What makes an A* in AQA Chemistry

	Topic	What to learn
C1	a. Balancing symbol equations	Chemical reactions can be represented by word equations or by symbol equations.
	b. Properties of emulsifiers	*Emulsifiers have hydrophilic and hydrophobic properties.*
	c. Hydrogenation of vegetable oils	*Vegetable oils that are unsaturated can be hardened by reacting them with hydrogen in the presence of a nickel catalyst at about 60 °C. Hydrogen adds to the carbon–carbon double bonds. The hydrogenated oils have higher melting points so they are solids at room temperature, making them useful as spreads and in cakes and pastries.*
	d. Origins of life	*Describe why we do not know how life was first formed. One theory as to how life was formed involves the interaction between hydrocarbons, ammonia and lightning*
	e. Fractional distillation of air	*Air is a mixture of gases with different boiling points and can be fractionally distilled to provide a source of raw materials used in a variety of industrial processes.*
C2	a. Metallic bonding	*Use diagrams to represent the bonding in metals. The electrons in the highest occupied energy levels (outer shell) of metal atoms are delocalised and so free to move through the whole structure. This corresponds to a structure of positive ions with electrons between the ions holding them together by strong electrostatic attractions.*
	b. Metallic bonding explanation	*Metals conduct heat and electricity because of the delocalised electrons in their structures.*
	c. Simple molecules	*Substances that consist of simple molecules have only weak forces between the molecules (intermolecular forces). It is these intermolecular forces that are overcome, not the covalent bonds, when the substance melts or boils.*
	d. Graphite	*In graphite, one electron from each carbon atom is delocalised. These delocalised electrons allow graphite to conduct heat and electricity. Explain the properties of graphite in terms of weak intermolecular forces between the layers.*
	e. Fullerenes and uses	*Carbon can also form fullerenes with different numbers of carbon atoms. Fullerenes can be used for drug delivery into the body, in lubricants, as catalysts, and in nanotubes for reinforcing materials, eg in tennis rackets.*
	f. Isotopic masses	*The relative atomic mass of an element (Ar) compares the mass of atoms of the element with the 12C isotope. It is an average value for the isotopes of the element.*
	g. Mass spectrometry	*The mass spectrometer can also give the relative molecular mass of each of the substances separated in the column.*
	h. Empirical formulas	*The empirical formula of a compound can be calculated from the masses or percentages of the elements in a compound.*
	i. Reacting masses	*The masses of reactants and products can be calculated from balanced symbol equations.*
	j. Percentage yield calculations	*Calculate percentage yields of reactions*
	k. Half equations	*Complete and balance half equations for the reactions occurring at the electrodes during electrolysis.*
C3	a. Trends in reactivity	*The trends in reactivity within groups in the periodic table can be explained because the higher the energy level of the outer electrons:* ■ *the more easily electrons are lost* ■ *the less easily electrons are gained*
	b. Hardness in water	*Temporary hard water contains hydrogencarbonate ions ($HCO3^-$) that decompose on heating to produce carbonate ions which react with calcium and magnesium ions to form precipitates.*
	c. Exothermic and endothermic	*In an exothermic reaction, the energy released from forming new bonds is greater than the energy needed to break existing bonds.*

C3	d. Bond enthalpy calculations	*In an endothermic reaction, the energy needed to break existing bonds is greater than the energy released from forming new bonds.*
	e. Titration calculations	*If the concentration of one of the reactants is known, the results of a titration can be used to find the concentration of the other reactant.*
	f. Haber process	*describe and evaluate the effects of changing the conditions of temperature and pressure on a given reaction or process*
	g. Reversible reactions	■ *When a reversible reaction occurs in a closed system, equilibrium is reached when the reactions occur at exactly the same rate in each direction.* ■ *The relative amounts of all the reacting substances at equilibrium depend on the conditions of the reaction* ■*These factors, together with reaction rates, are important when determining the optimum conditions in industrial processes, including the Haber process.*
	h. Temperature and yield	■*If the temperature is raised, the yield from the endothermic reaction increases and the yield from the exothermic reaction decreases.* ■*If the temperature is lowered, the yield from the endothermic reaction decreases and the yield from the exothermic reaction increases.*
	i. Pressure and yield	■*In gaseous reactions, an increase in pressure will favour the reaction that produces the least number of molecules as shown by the symbol equation for that reaction.*
	j. Weak acids	*Weak acids do not ionise completely when dissolved in water and so are weak acids* ■ *aqueous solutions of weak acids have a higher pH value than aqueous solutions of strong acids with the same concentration.*

What makes an A* in AQA Physics

	Topic	What to learn
P2	Calculating speed with distance-time graphs	*Calculation of the speed of an object from the gradient of a distance–time graph.*
	Calculations from velocity-time graphs	*Calculation of the acceleration of an object from the gradient of a velocity–time graph. Calculation of the distance travelled by an object from a velocity–time graph.*
	Explaining resistance	*Candidates should be able to explain resistance change in terms of ions and electrons.*
	Oscilloscope trace calculations	*Determine the period and hence the frequency of a supply from diagrams of oscilloscope traces.*
	E = V X Q	*Energy transferred, potential difference and charge are related by the equation: E = V x Q*
	Balancing nuclear equations	*Write nuclear equations to show single alpha and beta decay.*
	Alpha and beta particles in electronic fields	*Alpha and beta radiations are deflected by both electric and magnetic fields but gamma radiation is not. Explain this in terms of the relative mass and charge of each particle.*
P3	Shapes of lenses	*For a given focal length, the greater the refractive index, the flatter the lens. This means that the lens can be manufactured thinner.*
	Refractive index calculation	*Total internal reflection and critical angle*
	Moment calculations	*The calculation of the size of a force, or its distance from pivot, acting on an object that is balanced.*
	Centre of gravity	*If the line of action of the weight of an object lies outside the base of the object there will be a resultant moment and the body will tend to topple*