AQA GCSE Chemistry (Combined Science Trilogy)
15 Week Revision Timetable

Exam advice

- READ THE **WHOLE** QUESTION CAREFULLY before starting to write an answer.
- Make sure you have all the necessary equipment
- It's ok to draw diagrams even if there are lines for writing. Don't forget to label them.
- Underlining key words in the question may help to focus your mind
- Show all your workings in the space provided for each question
- Don't alter your working – cross it out and replace it
- Don't give the markers a choice of answers or methods
- Before rounding, show more figures than the question asks for
- Make a rough estimate of calculations. When estimating work to 1sf.
- Whenever possible, ask yourself "is my answer sensible?"
- Check your answers, especially if you have used a calculator!
- Don't rush but use time carefully
- Use the mark allocation to inform your answers
- Check the units given in the question and in your answer
- Remember to use the appropriate number of decimal places or significant figures.
- Don't confuse atoms, ions and molecules. If in doubt use "particles" instead.
- And the obvious – "dnt use txt or slng in xams coz xminrs nd 2 no what u r saing".

When revising……..

- **don't leave your revision until the night before the examination**
- create a revision timetable and stick to it
- study in a place where you can concentrate
- do lots of questions, especially past examination questions
- start revising by topics and nearer the examination mix up the questions
- focus on your weaker topics but revise others as well
- learn formula and facts off by heart, consider writing prompt sheets
- remember to use diagram, statement, working answer, units
- know which topics are covered on paper 1 and which are on paper 2.
- revise REQUIRED PRACTICALS very carefully
- consider using a revision workbook
- use online revision websites especially You Tube as there are lots of suitable GCSE tutorials there..

Some useful websites……
https://www.bbc.com/bitesize/topics/z88jjty
https://www.bbc.com/bitesize/examspecs/z8xtmnb
You tube has some excellent tutorials!

Know what the main command words in questions mean

- Write down
- State
- Describe
- Explain
- Suggest
- Calculate
- Compare

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Here is a summary of the topics to be covered in this revision timetable

Weeks before the exam	Topic
15.	Paper 1 Topic: Atomic Structure
14.	Paper 1 Topic: The Periodic Table
13.	Paper 1 Topic: Bonding, Structure and the properties of matter
12.	Paper 1 Topic: Properties of Materials
11.	Paper 1 Topic: Quantitative Chemistry, Moles and Calculations
10.	Paper 1 Topic: More Quantitative Chemistry, Moles and Calculations
9.	Paper 1 Topic: Chemical Changes and Reactions including REDOX
8.	Paper 1 Topic: The Reactions of Acids
7.	Paper 1 Topic: Electrolysis
6.	Paper 1 Topic: Energy Changes
5.	Paper 2 Topic: Rates of Reactions and Reversible Reactions (Equilibria)
4.	Paper 2 Topic: Organic Chemistry
3.	Paper 2 Topic: Chemical Analysis
2.	Paper 2 Topic: Using Resources
1.	Paper 2 Topic: Chemistry of the Atmosphere
DON'T FORGET TO REVISE THESE!	REQUIRED PRACTICALS (Both in Paper 1 and Paper 2)

Key Words and Terms in Chemistry

Atom	Group	Simple molecular structure	Soluble	Exothermic	Control variable	Concentration
Molecule	Period	isotope	Insoluble	Endothermic	Error	Strength (pH)
Ion	Electron arrangement	allotrope	Precipitate	Bond energy	Atom economy	Neutralisation
Filtration	Covalent	Mole	Collision theory	Energy level diagram	nanoparticle	Salt
Distillation	Ionic	Relative Atomic mass	Electrolysis	Equilibrium	photomining	Polymer
Chromatography	Metallic	Relative Molecular mass	Cation	Gradient	corrosion	Independent variable
Rf value	Giant structure	Alloy	Anion	Tangent	REDOX	Dependent Variable
Displacement Reaction	Delocalised	Energy Level (shell)	Nucleus	Activation Energy	Anomalous	Best fit line

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Paper 1 WEEK 1
Atomic structure and the periodic table

Topic	I CAN	R	A	G
4.1.1 A simple model of the atom, symbols, relative atomic mass, electronic charge and isotopes	State that everything is made of atoms and recall what they are			
	Describe what elements and compounds are			
	State that elements and compounds are represented by symbols; and use chemical symbols and formulae to represent elements and compounds			
	Write word equations and balanced symbol equations for chemical reactions, including using appropriate state symbols			
	HT ONLY: Write balanced half equations and ionic equations			
	Describe what a mixture is			
	Name and describe the physical processes used to separate mixtures and suggest suitable separation techniques			
	Describe how the atomic model has changed over time due to new experimental evidence, inc discovery of the atom and scattering experiments (inc the work of James Chadwick)			
	Describe the difference between the plum pudding model of the atom and the nuclear model of the atom			
	State the relative charge of protons, neutrons and electrons and describe the overall charge of an atom			
	State the relative masses of protons, neutrons and electrons and describe the distribution of mass in an atom			
	Calculate the number of protons, neutrons and electrons in an atom when given its atomic number and mass number			
	Describe isotopes as atoms of the same element with different numbers of neutrons			
	Define the term relative atomic mass and why it takes into account the abundance of isotopes of the element			
	Calculate the relative atomic mass of an element given the percentage abundance of its isotopes			
	Describe how electrons fill energy levels in atoms, and represent the electron structure of elements using diagrams and numbers			

Paper 1 WEEK 2
The Periodic Table

Topic	I CAN			
4.1.2 The periodic table	Recall how the elements in the periodic table are arranged			
	Describe how elements with similar properties are placed in the periodic table			
	Explain why elements in the same group have similar properties and how to use the periodic table to predict the reactivity of elements			
	Describe the early attempts to classify elements			
	Explain the creation and attributes of Mendeleev's periodic table			
	Identify metals and non-metals on the periodic table, compare and contrast their properties			
	Explain how the atomic structure of metals and non-metals relates to their position in the periodic table			
	Describe nobel gases (group 0) and explain their lack of reactivity			
	Describe the properties of noble gases, including boiling points, predict trends down the group and describe how their properties depend on the outer shell of electrons			
	Describe the reactivity and properties of group 1 alkali metals with reference to their electron arrangement and predict their reactions			
	Describe the properties of group 7 halogens and how their properties relate to their electron arrangement, including trends in molecular mass, melting and boiling points and reactivity			
	Describe the reactions of group 7 halogens with metals and non-metals			

Paper 1 WEEK 3
Bonding, structure, and the properties of matter

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Topic	I CAN	R	A	G
4.2.1 Chemical bonds, ionic, covalent and metallic	Describe the three main types of bonds: ionic bonds, covalent bonds and metallic bonds in terms of electrostatic forces and the transfer or sharing of electrons			
	Describe how the ions produced by elements in some groups have the electronic structure of a noble gas and explain how the charge of an ion relates to its group number			
	Describe the structure of ionic compounds, including the electrostatic forces of attraction, and represent ionic compounds using dot and cross diagrams			
	Describe the limitations of using dot and cross, ball and stick, two and three-dimensional diagrams to represent a giant ionic structure			
	Work out the empirical formula of an ionic compound from a given model or diagram that shows the ions in the structure			
	Describe covalent bonds and identify different types of covalently bonded substances, such as small molecules, large molecules and substances with giant covalent structures			
	Represent covalent bonds between small molecules, repeating units of polymers and parts of giant covalent structures using diagrams			
	Draw dot and cross diagrams for the molecules of hydrogen, chlorine, oxygen, nitrogen, hydrogen chloride, water, ammonia and methane			
	Deduce the molecular formula of a substance from a given model or diagram in these forms showing the atoms and bonds in the molecule			
	Describe the arrangement of atoms and electrons in metallic bonds and draw diagrams the bonding in metals			
Paper 1 WEEK 4 Bonding and the Properties of Materials				
Topic	**I CAN**			
4.2.2 How bonding and structure are related to the properties of substances	Name the three States of matter, identify them from a simple model and state which changes of state happen at melting and boiling points			
	Explain changes of state using particle theory and describe factors that affect the melting and boiling point of a substance			
	HT ONLY: Discuss the limitations of particle theory			
	Recall what (s), (l), (g) and (aq) mean when used in chemical equations and be able to use them appropriately			
	Explain how the structure of ionic compounds affects their properties, including melting and boiling points and conduction of electricity (sodium chloride structure only)			
	Explain how the structure of small molecules affects their properties			
	Explain how the structure of polymers affects their properties			
	Explain how the structure of giant covalent structures affects their properties			
	Explain how the structure of metals and alloys affects their properties, including explaining why they are good conductors			
	Explain why alloys are harder than pure metals in terms of the layers of atoms			
	Explain the properties of graphite, diamond and graphene in terms of their structure and bonding			
	Describe the structure of fullerenes, and their uses, including Buckminsterfullerene and carbon nanotubes			

Paper 1 WEEK 5 <u>AND</u> WEEK 6 Quantitative chemistry				
Topic	**I CAN**	**R**	**A**	**G**
4.3.1 Chemical	State that mass is conserved and explain why, including describing balanced equations in terms of conservation of mass			

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	Explain the use of the multipliers in equations in normal script before a formula and in subscript within a formula			
	Describe what the relative formula mass (Mr) of a compound is and calculate the relative formula mass of a compound, given its formula			
	Calculate the relative formula masses of reactants and products to prove that mass is conserved in a balanced chemical equation			
	Explain observed changes of mass during chemical reactions in non-enclosed systems using the particle model when given the balanced symbol equation			
	Explain why whenever a measurement is made there is always some uncertainty about the result obtained			
4.3.2 Use of amount of substance in relation to masses of pure substances	**HT ONLY: State that chemical amounts are measured in moles (mol) and explain what a mol is with reference to relative formula mass and Avogadro's constant**			
	HT ONLY: Use the relative formula mass of a substance to calculate the number of moles in a given mass of the substance			
	HT ONLY: Calculate the masses of reactants and products when given a balanced symbol equation			
	HT ONLY: Use moles to write a balanced equation when given the masses of reactants and products (inc changing the subject of the equation)			
	HT ONLY: Explain the effect of limiting the quantity of a reactant on the amount of products in terms of moles or masses in grams			
	Calculate the mass of solute in a given volume of solution of known concentration in terms of mass per given volume of solution			
	HT ONLY: Explain how the mass of a solute and the volume of a solution is related to the concentration of the solution			
	HT ONLY: Calculate the theoretical mass of a product from a given mass of reactant and the balanced equation for the reaction			
	HT ONLY: Explain why a particular reaction pathway is chosen to produce a specified product, given appropriate data			
4.3.4 Using concentrations of solutions in mol/dm^3	**HT ONLY: Calculate the amount of solute (in moles or grams) in a solution from its concentration in mol/dm^3**			
	HT ONLY: Calculate the concentration of a solution when it reacts completely with another solution of a known concentration			
	HT ONLY: Describe how to carry out titrations of strong acids and strong alkalis and calculate quantities in titrations involving concentrations in mol/dm^3 and g/dm^3			
	HT ONLY: Explain how the concentration of a solution in mol/dm3 is related to the mass of the solute and the volume of the solution			
	HT ONLY: Explain what the volume of one mole of any gas at room temperature is			
	HT ONLY: Calculate the volume of a gas at room temperature and pressure from its mass and relative formula mass			

Paper 1 WEEK 7
Chemical changes

Topic	I CAN	R	A	G
4.4.1 Reactivity of metals	Describe how metals react with oxygen and state the compound they form, define oxidation and reduction			
	Describe the arrangement of metals in the reactivity series, including carbon and hydrogen, and use the reactivity series to predict the outcome of displacement reactions			
	Recall and describe the reactions, if any, of potassium, sodium, lithium, calcium, magnesium, zinc, iron and copper with water or dilute acids			

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	Relate the reactivity of metals to its tendency to form positive ions and be able to deduce an order of reactivity of metals based on experimental results			
	Recall what native metals are and explain how metals can be extracted from the compounds in which they are found in nature by reduction with carbon			
	Evaluate specific metal extraction processes when given appropriate information and identify which species are oxidised or reduced			
4.4.2 Reactions of acids	**HT ONLY: Describe oxidation and reduction in terms of loss and gain of electrons**			
	HT ONLY: Write ionic equations for displacement reactions, and identify which species are oxidised and reduced from a symbol or half equation			
	HT ONLY: Explain in terms of gain or loss of electrons that the reactions between acids and some metals are redox reactions, and identify which species are oxidised and which are reduced (Mg, Zn, Fe + HCl & H_2SO_4)			
	Paper 1 WEEK 8 **THE REACTIONS OF ACIDS**			
	I CAN			
	Explain that acids can be neutralised by alkalis, bases and metal carbonates and list the products of each of these reactions			
	Predict the salt produced in a neutralisation reaction based on the acid used and the positive ions in the base, alkali or carbonate and use the formulae of common ions to deduce the formulae of the salt			
	Describe how soluble salts can be made from acids and how pure, dry samples of salts can be obtained			
	Required practical 1: *preparation of a pure, dry sample of a soluble salt from an insoluble oxide or carbonate using a Bunsen burner to heat dilute acid and a water bath or electric heater to evaporate the solution*			
	Recall what the pH scale measures and describe the scale used to identify acidic, neutral or alkaline solutions			
	Define the terms acid and alkali in terms of production of hydrogen ions or hydroxide ions (in solution), define the term base			
	Describe the use of universal indicator to measure the approximate pH of a solution and use the pH scale to identify acidic or alkaline solutions			
	HT ONLY: Calculate the chemical quantities in titrations involving concentrations in mol/dm^3 and in g/dm^3			
	HT ONLY: Use and explain the terms dilute and concentrated (in terms of amount of substance) and weak and strong (in terms of the degree of ionisation) in relation to acids			
	HT ONLY: Explain how the concentration of an aqueous solution and the strength of an acid affects the pH of the solution and how pH is related to the hydrogen ion concentration of a solution			

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	Paper 1 WEEK 9 ELECTROLYSIS
Topic	**I CAN**
4.4.3 Electrolysis	Describe how ionic compounds can conduct electricity when dissolved in water and describe these solutions as electrolytes
	Describe the process of electrolysis
	Describe the electrolysis of molten ionic compounds and predict the products at each electrode of the electrolysis of binary ionic compounds
	Explain how metals are extracted from molten compounds using electrolysis and use the reactivity series to explain why some metals are extracted with electrolysis instead of carbon
	Describe the electrolysis of aqueous solutions and predict the products of the electrolysis of aqueous solutions containing single ionic compounds
	Required practical 3: *investigate what happens when aqueous solutions are electrolysed using inert electrodes* **HT ONLY: Describe the reactions at the electrodes during electrolysis as oxidation and reduction reactions and write balanced half equations for these reactions**

Paper 1 WEEK 10 Energy changes				
Topic	**I CAN**	**R**	**A**	**G**
4.5.1 Exothermic and endothermic reactions	Describe how energy is transferred to or from the surroundings during a chemical reaction			
	Explain exothermic and endothermic reactions on the basis of the temperature change of the surroundings and give examples of everyday uses			
	Required practical 4*: investigate the variables that affect temperature changes in reacting solutions*			
	Describe what the collision theory is and define the term activation energy			
	Interpret and draw reaction profiles of exothermic and endothermic reactions, inc identifying the relative energies of reactants and products, activation energy and overall energy change			
	HT ONLY: Explain the energy changes in breaking and making bonds and calculate the overall energy change using bond energies			

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Paper 2 WEEK 11
The Rate of Reaction and Reversible Reactions (Equilibria)

Topic	I CAN	R	A	G
4.6.1 Rate of reaction	Calculate the rate of a chemical reaction over time, using either the quantity of reactant used or the quantity of product formed, measured in g/s, cm^3/s or mol/s			
	Draw and interpret graphs showing the quantity of product formed or reactant used up against time and use the tangent to the graph as a measure of the rate of reaction			
	HT ONLY: Calculate the gradient of a tangent to the curve on the graph of the quantity of product formed or reactant used against time and use this as a measure of the rate of reaction			
	Describe how different factors affect the rate of a chemical reaction, including the concentration, pressure, surface area, temperature and presence of catalysts			
	Required practical 5: *investigate how changes in concentration affect the rates of reactions by a method involving measuring the volume of a gas produced, change in colour or turbidity*			
	Use collision theory to explain changes in the rate of reaction, including discussing activation energy			
	Describe the role of a catalyst in a chemical reaction and state that enzymes are catalysts in biological systems			
	Draw and interpret reaction profiles for catalysed reactions			
4.6.2 Reversible reactions and dynamic equilibrium	Explain what a reversible reaction is, including how the direction can be changed and represent it using symbols: A + B ⇌ C + D			
	Explain that, for reversible reactions, if a reaction is endothermic in one direction, it is exothermic in the other direction			
	Describe the State of dynamic equilibrium of a reaction as the point when the forward and reverse reactions occur at exactly the same rate			
	HT ONLY: Explain that the position of equilibrium depends on the conditions of the reaction and the equilibrium will change to counteract any changes to conditions (Le Chaterier's Principle)			
	HT ONLY: Explain and predict the effect of a change in concentration of reactants or products, temperature, or pressure of gases on the equilibrium position of a reaction			

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Paper 2 WEEK 12 Organic Chemistry				
Topic	**I CAN**			
4.7.1 Carbon Compounds as fuels and feedstocks	Describe what crude oil is and where it comes from, including the basic composition of crude oil and the general chemical formula for the alkanes			
	State the names of the first four members of the alkanes and recognise substances as alkanes from their formulae			
	Describe the process of fractional distillation, state the names and uses of fuels that are produced from crude oil by fractional distillation			
	Describe trends in the properties of hydrocarbons, including boiling point, viscosity and flammability and explain how their properties influence how they are used as fuels			
	Describe and write balanced chemical equations for the complete combustion of hydrocarbon fuels			
	Describe the process of cracking and state that the products of cracking include alkanes and alkenes and describe the test for alkenes			
	Balance chemical equations as examples of cracking when given the formulae of the reactants and products			
	Explain why cracking is useful and why modern life depends on the uses of hydrocarbons including the formation of polymers			

	Paper 2 WEEK 13 Chemical Analysis			
Topic	**I CAN**			
4.8.1 Purity, formulations and chromatography and testing for gases	Define a pure substance and identify pure substances and mixtures from data about melting and boiling points			
	Describe a formulation and identify formulations given appropriate information			
	Describe chromatography, including the terms stationary phase and mobile phase and identify pure substances using paper chromatography			
	Explain what the Rf value of a compound represents, how the Rf value differs in different solvents and interpret and determine Rf values from chromatograms			
	Required practical 6: *investigate how paper chromatography can be used to separate and tell the difference between coloured substances (inc calculation of Rf values)*			
	Explain how to test for the presence of hydrogen, oxygen, carbon dioxide and chlorine			

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Paper 2 WEEK 14 Using resources				
Topic	**I Can**	**R**	**A**	**G**
4.10.1 Using the Earth's resources and obtaining potable water	State what humans use Earth's resources for, give some examples of natural resources that they use			
	Define the term finite and distinguish between finite and renewable resources			
	Explain what sustainable development is and discuss the role chemistry plays in sustainable development, including improving agricultural and industrial processes			
	State examples of natural products that are supplemented or replaced by agricultural and synthetic products			
	Discuss the importance of water quality for human life, including defining potable water			
	Describe methods to produce potable water, including desalination of salty water or sea water and the potential problems of desalination			
	Required practical 8: *analysis and purification of water samples from different sources, including pH, dissolved solids and distillation.*			
	Describe waste water as a product of urban lifestyles and industrial processes that includes organic matter, harmful microbes and harmful chemicals			
	Describe the process of sewage treatment and compare the ease of obtaining potable water from waste water as opposed to ground or salt water			
	HT ONLY: Name and describe alternative biological methods for extracting metals, including phytomining and bioleaching			
	HT ONLY: Evaluate alternative methods for extracting metals			
4.10.2 Life cycle assessment and recycling	Describe, carry out and interpret a simple comparative life cycle assessment (LCA) of materials or products			
	Discuss the advantages and disadvantages of LCAs			
	Carry out simple comparative LCAs for shopping bags made from plastic and paper			
	Discuss how to reduce the consumption of raw resources and explain how reusing and recycling reduces energy use (inc environmental impacts)			

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Paper 2 Week 15 Chemistry of the atmosphere				
Topic	**I CAN**	**R**	**A**	**G**
4.9.1 The composition and evolution of the Earth's atmosphere	Describe the composition of gases in the Earth's atmosphere using percentages, fractions or ratios			
	Describe how early intense volcanic activity may have helped form the early atmosphere and how the oceans formed			
	Explain why the levels of carbon dioxide in the atmosphere changes as the oceans were formed			
	State the approximate time in Earth's history when algae started producing oxygen and describe the effects of a gradually increasing oxygen level			
	Explain the ways that atmospheric carbon dioxide levels decreased			
4.9.2 Carbon dioxide and methane as greenhouse gases	Name some greenhouse gases and describe how they cause an increase in Earth's temperature			
	List some human activities that produce greenhouse gases			
	Evaluate arguments for and against the idea that human activities cause a rise in temperature that results in global climate change			
	State some potential side effects of global climate change, including discussing scale, risk and environmental implications			
	Define the term carbon footprint and list some actions that could reduce the carbon footprint			
4.9.3 Common atmospheric pollutants and their sources	Describe the combustion of fuels as a major source of atmospheric pollutants and name the different gases that are released when a fuel is burned			
	Predict the products of combustion of a fuel given appropriate information about the composition of the fuel and the conditions in which it is used			
	Describe the properties and effects of carbon monoxide, sulfur dioxide and particulates in the atmosphere			
	Describe and explain the problems caused by increased amounts of these pollutants in the air			

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DON'T FORGET! Required Practicals		
Topic	**What you did in the required practical and what you need to know…**	**Revised**
1. Making Salts	Preparation of a pure, dry sample of a soluble salt from an insoluble oxide or carbonate, using a Bunsen burner to heat dilute acid and a water bath or electric heater to evaporate the solution. https://www.youtube.com/watch?v=qIOMlwBoe_4	
2. Electrolysis	Investigate what happens when aqueous solutions are electrolysed using inert electrodes. This should be an investigation involving developing a hypothesis. https://www.youtube.com/watch?v=tCHE_7QeRUc	
3. Temperature Changes	Investigate the variables that affect temperature changes in reacting solutions, e.g. acid plus metals, acid plus carbonates, neutralisations, displacement of metals https://www.youtube.com/watch?v=tKxcQYZ2YH8	
4. Rates of Reaction	Investigate how changes in concentration affect the rates of reactions by a method involving measuring the volume of a gas produced and a method involving a change in colour or turbidity (going cloudy). This should be an investigation involving developing a hypothesis. https://www.youtube.com/watch?v=Gl6LVl7oAlU https://www.youtube.com/watch?v=ssa3wh3RNt0	
5. Chromatography	Investigate how paper chromatography can be used to separate and tell the difference between coloured substances. Students should calculate Rf values. https://www.youtube.com/watch?v=pnTGNAfu6GE	
6. Water Purification	Analysis and purification of water samples from different sources, including pH, dissolved solids and distillation. https://www.youtube.com/watch?v=_UGHsbTEBvA	

Other demonstrations and explanations of **all** the required practicals can be found on **YOU TUBE**

Questions based on required practicals may ask you to;

- Plan an investigation
- Describe appropriate ways to measure and collect chemicals safely
- Write a detailed and sequenced method
- Recognise key variables (Independent, Dependent and Control)
- Identify anomalous results
- Point out errors in an investigation
- Suggest improvements to an investigation
- Analyse and evaluate data

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