BIOLOGY

Revision Checklist: GCSE AQA Combined Science: Trilogy (Higher Tier)

	1. CELL BIOLOGY	Subject Knowledge *(tick as appropriate)*	Practice Questions *(tick as appropriate)*
a.	Eukaryotes & prokaryotes		
b.	Animal & plant cells		
c.	Cell specialisation		
d.	Microscopy		
e.	The cell cycle		
f.	Stem cells		
g.	Diffusion		
h.	Exchange surfaces		
i.	Osmosis		
j.	Active transport		

	2. ORGANISATION	Knowledge	Practice
a.	Cells, tissues, organs & systems		
b.	Enzymes		
c.	Human digestive system		
d.	The lungs		
e.	The heart		
f.	Blood vessels		
g.	Blood		
h.	Coronary heart disease		
i.	Health & disease		
j.	Risk factors for non-communicable diseases		
k.	Cancer		
l.	Plant tissues		
m.	Transpiration & translocation		
n.	Adaptations of plant cells		
o.	Rate of transpiration		

	3. INFECTION & RESPONSE	Knowledge	Practice
a.	Communicable diseases		
b.	Viral diseases		
c.	Bacterial diseases		
d.	Fungal diseases		
e.	Protist diseases		
f.	Human defence systems		
g.	Vaccination		
h.	Antibiotics & painkillers		
i.	Discovery of drugs		
j.	Drug tests & trials		

	4. BIOENERGETICS	Knowledge	Practice
a.	Photosynthesis		
b.	Rate of photosynthesis		
c.	Uses of glucose		
d.	Aerobic & anaerobic respiration		
e.	Body's response to exercise		
f.	Metabolism		

	5. HOMEOSTASIS & RESPONSE	Knowledge	Practice
a.	Homeostasis		
b.	The reflex arc		
c.	The endocrine system		
d.	Blood glucose control		
e.	Diabetes		
f.	Hormones in reproduction		
g.	The menstrual cycle		
h.	Contraception		
i.	Treating infertility		
j.	Thyroxine & adrenaline		

	6. INHERITANCE, VARIATION & EVOLUTION	Knowledge	Practice
a.	Sexual & asexual reproduction		
b.	Meiosis		
c.	DNA structure		
d.	The genome		
e.	Alleles & inheritance		
f.	Inherited disorders		
g.	Sex determination		
h.	Variation		
i.	Selective breeding		
j.	Genetic engineering		
k.	Cloning		
l.	The theory of evolution		
m.	Speciation		
n.	Fossils		
o.	Extinction		
p.	Antibiotic resistant bacteria		
q.	Classification of organisms		

	7. ECOLOGY	Knowledge	Practice
a.	Communities & interdependence		
b.	Abiotic & biotic factors		
c.	Adaptations		
d.	Food chains & webs		
e.	Predator-prey cycles		
f.	Carbon & water cycle		
g.	Biodiversity		
h.	Waste management		
i.	Land use & deforestation		
j.	Global warming		
k.	Maintaining biodiversity		

CHEMISTRY

	8. ATOMIC STRUCTURE & THE PERIODIC TABLE	Knowledge	Practice
a.	Elements, compounds & mixtures		
b.	Separating mixtures		
c.	Development of atomic model		
d.	Mass & atomic number		
e.	Relative atomic mass		
f.	Electronic structure		
g.	Groups & periods		
h.	Development of periodic table		
i.	Metals & non-metals		
j.	Group 0 elements		
k.	Group 1 elements		
l.	Group 7 elements		

	9. BONDING, STRUCTURE & THE PROPERTIES OF MATTER	Knowledge	Practice
a.	Ionic bonding		
b.	Covalent bonding		
c.	Dot & cross diagrams		
d.	Metallic bonding		
e.	States of matter		
f.	Properties of ionic compounds		
g.	Properties of small molecules		
h.	Polymers & giant covalent structures		
i.	Properties of metals		
j.	Alloys		
k.	Diamond & graphite		
l.	Graphene & fullerenes		

	10. QUANTITATIVE CHEMISTRY	Knowledge	Practice
a.	Balancing chemical equations		
b.	Conservation of mass		
c.	Relative formula mass		
d.	Estimating uncertainty		
e.	Moles		
f.	Using moles to calculate masses		
g.	Using moles to balance equations		
h.	Limiting reactants		
i.	Concentration		

	11. CHEMICAL CHANGES	Knowledge	Practice
a.	The reactivity series		
b.	Reduction & oxidation		
c.	Extracting metals by reduction		
d.	Ionic & half equations		
e.	Reacting acids with metals		
f.	Neutralisation of acids & naming salts		
g.	pH		
h.	Strong & weak acids		
i.	Electrolysis of molten ionic compounds		
j.	Electrolysis of aqueous solutions		

	12. ENERGY CHANGES	Knowledge	Practice
a.	Exothermic & endothermic reactions		
b.	Reaction profiles		
c.	Calculating energy change of reactions		

CHEMISTRY

	13. THE RATE & EXTENT OF CHEMICAL CHANGE	Knowledge	Practice
a.	Calculating rate of reaction		
b.	Factors affecting rate of reaction		
c.	Collision theory & activation energy		
d.	Catalysts		
e.	Reversible reactions		
f.	Le Chatelier's principle		
g.	Factors which affect equilibrium		

	14. ORGANIC CHEMISTRY	Knowledge	Practice
a.	Crude oil		
b.	Alkanes		
c.	Fractional distillation		
d.	Properties of hydrocarbons		
e.	Combustion reactions		
f.	Alkenes		
g.	Addition reactions		
h.	Cracking		

	15. CHEMICAL ANALYSIS	Knowledge	Practice
a.	Purity		
b.	Formulations		
c.	Paper chromatography		
d.	Tests for common gases		

	16. CHEMISTRY OF THE ATMOSPHERE	Knowledge	Practice
a.	Composition of Earth's atmosphere		
b.	Evolution of Earth's atmosphere		
c.	The greenhouse effect		
d.	Human activity & greenhouse gases		
e.	Global climate change		
f.	The carbon footprint		
g.	Atmospheric pollutants		

	17. USING RESOURCES	Knowledge	Practice
a.	Using Earth's resources		
b.	Potable water		
c.	Waste water treatment		
d.	Low-grade copper ores		
e.	Life cycle assessment		
f.	Recycling		

The Periodic Table of Elements

1	2											3	4	5	6	7	0
							1 H hydrogen 1										4 He helium 2
7 Li lithium 3	9 Be beryllium 4											11 B boron 5	12 C carbon 6	14 N nitrogen 7	16 O oxygen 8	19 F fluorine 9	20 Ne neon 10
23 Na sodium 11	24 Mg magnesium 12											27 Al aluminium 13	28 Si silicon 14	31 P phosphorus 15	32 S sulfur 16	35.5 Cl chlorine 17	40 Ar argon 18
39 K potassium 19	40 Ca calcium 20	45 Sc scandium 21	48 Ti titanium 22	51 V vanadium 23	52 Cr chromium 24	55 Mn manganese 25	56 Fe iron 26	59 Co cobalt 27	59 Ni nickel 28	63.5 Cu copper 29	65 Zn zinc 30	70 Ga gallium 31	73 Ge germanium 32	75 As arsenic 33	79 Se selenium 34	80 Br bromine 35	84 Kr krypton 36
85 Rb rubidium 37	88 Sr strontium 38	89 Y yttrium 39	91 Zr zirconium 40	93 Nb niobium 41	96 Mo molybdenum 42	[97] Tc technetium 43	101 Ru ruthenium 44	103 Rh rhodium 45	106 Pd palladium 46	108 Ag silver 47	112 Cd cadmium 48	115 In indium 49	119 Sn tin 50	122 Sb antimony 51	128 Te tellurium 52	127 I iodine 53	131 Xe xenon 54
133 Cs caesium 55	137 Ba barium 56	139 La* lanthanum 57	178 Hf hafnium 72	181 Ta tantalum 73	184 W tungsten 74	186 Re rhenium 75	190 Os osmium 76	192 Ir iridium 77	195 Pt platinum 78	197 Au gold 79	201 Hg mercury 80	204 Tl thallium 81	207 Pb lead 82	209 Bi bismuth 83	[209] Po polonium 84	[210] At astatine 85	[222] Rn radon 86
[223] Fr francium 87	[226] Ra radium 88	[227] Ac* actinium 89	[267] Rf rutherfordium 104	[270] Db dubnium 105	[269] Sg seaborgium 106	[270] Bh bohrium 107	[270] Hs hassium 108	[278] Mt meitnerium 109	[281] Ds darmstadtium 110	[281] Rg roentgenium 111	[285] Cn copernicium 112	[286] Nh nihonium 113	[289] Fl flerovium 114	[289] Mc moscovium 115	[293] Lv livermorium 116	[293] Ts tennessine 117	[294] Og oganesson 118

Key: relative atomic mass / atomic symbol / name / atomic (proton) number

* The Lanthanides (atomic numbers 58 – 71) and the Actinides (atomic numbers 90 – 103) have been omitted.

Relative atomic masses for **Cu** and **Cl** have not been rounded to the nearest whole number.

PHYSICS

	18. ENERGY	Knowledge	Practice
a.	Energy stores		
b.	Changes in energy		
c.	Kinetic energy		
d.	Gravitational & elastic potential energy		
e.	Specific heat capacity		
f.	Power & work done		
g.	Conduction		
h.	Unwanted energy transfers		
i.	Efficiency		
j.	Energy resources (renewable & non-renewable)		
k.	Energy resources (environmental impact)		

	19. ELECTRICITY	Knowledge	Practice
a.	Circuit diagram symbols		
b.	Charge & current		
c.	Current, resistance & potential difference		
d.	I-V characteristic curves		
e.	LDR & thermistor		
f.	Series & parallel circuits		
g.	D.C. & A.C.		
h.	Mains electricity		
i.	Power in circuits		
j.	Energy transfers in electrical appliances		
k.	The national grid		
l.	Role of transformers		

	20. PARTICLE MODEL OF MATTER	Knowledge	Practice
a.	Density		
b.	Changes of state		
c.	Internal energy		
d.	Specific heat capacity *(again)*		
e.	Specific latent heat		
f.	Particle motion in gases		

	21. ATOMIC STRUCTURE	Knowledge	Practice
a.	Structure of an atom		
b.	Mass number, atomic number & isotopes		
c.	Development of atomic model		
d.	Radioactive decay		
e.	Properties of nuclear radiation		
f.	Nuclear equations		
g.	Half life		
h.	Contamination & irradiation		

	22. FORCES	Knowledge	Practice
a.	Scalars & vectors		
b.	Contact & non-contact forces		
c.	Gravity & weight		
d.	Resultant forces		
e.	Vector diagrams		
f.	Work done		
g.	Springs & elasticity		
h.	Distance & displacement		
i.	Speed & velocity		
j.	Distance-time graphs		
k.	Acceleration		
l.	Velocity-time graphs		
m.	Terminal velocity		
n.	Newton's first law		
o.	Newton's second law & inertia		
p.	Newton's third law		
q.	Stopping distance & reaction time		
r.	Factors affecting braking distance		
s.	Momentum		

	23. WAVES	Knowledge	Practice
a.	Transverse & longitudinal waves		
b.	Properties of waves		
c.	Refraction		
d.	Ray diagrams (refraction)		
e.	Waves for detection & exploration		
f.	Electromagnetic (EM) spectrum		
g.	Radio waves		
h.	Risks of EM radiation		
i.	Uses of EM waves		

	24. MAGNETISM & ELECTRO-MAGNETISM	Knowledge	Practice
a.	Bar magnets		
b.	Magnetic fields		
c.	Electromagnets		
d.	The motor effect & Fleming's left-hand rule		
e.	Electric motors		

EQUATIONS *(not given in exam)*	
Weight = mass x gravitational field strength	$W = m\,g$
Work done = force x distance	$W = F\,s$
Force (applied to a spring) = spring constant x extension	$F = k\,e$
Distance = speed x time	$s = v\,t$
Acceleration = $\frac{\text{change in velocity}}{\text{time}}$	$a = \frac{\Delta v}{t}$
Resultant force = mass x acceleration	$F = m\,a$
Momentum = mass x velocity	$p = m\,v$
Kinetic energy = 0.5 x mass x (speed)^2	$E_K = \frac{1}{2}\,m\,v^2$
Gravitational potential energy = mass x gravitational field strength x height	$E_P = m\,g\,h$
Power = $\frac{\text{energy transferred}}{\text{time}}$	$P = \frac{E}{t}$
Power = $\frac{\text{work done}}{\text{time}}$	$P = \frac{W}{t}$
Efficiency = $\frac{\text{useful energy out}}{\text{total energy in}}$	
Efficiency = $\frac{\text{useful power out}}{\text{total power in}}$	
Wave speed = frequency x wavelength	$v = f\,\lambda$
Charge = current x time	$Q = I\,t$
Potential difference = current x resistance	$V = I\,R$
Power = potential difference x current	$P = V\,I$
Power = (current)^2 x resistance	$P = I^2\,R$
Energy transferred = charge x potential difference	$E = Q\,V$
Density = $\frac{\text{mass}}{\text{volume}}$	$\rho = \frac{m}{V}$

PRACTICALS

PRACTICALS	Knowledge
RP 1: "Make use of a light microscope to observe, draw and label plant and animal cells."	
RP 2: "Investigate the effect of different concentrations of salt or sugar solutions on the mass of plant tissue."	
RP 3: "Make use of reagents to test for the presence of different carbohydrates, lipids and proteins."	
RP 4: "Investigate the effect of pH on the rate of reaction of amylase."	
RP 5: "Investigate the effect of light intensity on the rate of photosynthesis of an aquatic plant."	
RP 6: "Investigate the effect of a specific factor on human reaction time."	
RP 7: "Use sampling techniques to investigate the effect of a specific factor on the distribution of a species in a habitat."	
RP 8: "Prepare a pure, dry sample of a soluble salt from an insoluble oxide or carbonate."	
RP 9: "Investigate the electrolysis of aqueous solutions (a hypothesis must be formed and developed)."	
RP 10: "Investigate factors affecting temperature change when reacting solutions together."	
RP 11a: "Investigate how concentration affects the rate of reaction by measuring the volume of gas produced (a hypothesis must be formed and developed)."	
RP 11b: "Investigate how concentration affects the rate of reaction by observing a colour change (a hypothesis must be formed and developed)."	
RP 12: "Use paper chromatography to separate coloured substances and determine R_f values."	
RP 13: "Identify pH and amount of dissolved solids in water samples from different sources, and use distillation to purify them."	
RP 14: "An investigation to determine the specific heat capacity of one or more materials."	
RP 15a: "Investigate how the length of a wire at constant temperature affects the resistance of electrical circuits."	
RP 15b: "Investigate how combinations of resistors in series and parallel affect the resistance of electrical circuits."	
RP 16: "Use circuit diagrams to investigate the I-V characteristics of a filament lamp, a diode and a resistor at constant temperature."	
RP 17: "Determine the densities of regular and irregular solid objects and liquids."	
RP 18: "Investigate the relationship between force and extension of a spring."	
RP 19: "Investigate separately how varying the force and mass of an object affect its acceleration."	
RP 20: "Measure the frequency, wavelength and speed of waves in a ripple tank, and waves in a solid."	
RP 21: "Investigate how the amount of infrared radiation absorbed and radiated depends on the type of surface."	

ASSESSMENTS	Duration	Marks	Topics
Biology Paper 1	1 hour 15 min	70 marks	Topics 1 – 4
Biology Paper 2	1 hour 15 min	70 marks	Topics 5 - 7
Chemistry Paper 1	1 hour 15 min	70 marks	Topics 8 – 12
Chemistry Paper 2	1 hour 15 min	70 marks	Topics 13 - 17
Physics Paper 1	1 hour 15 min	70 marks	Topics 18 – 21
Physics Paper 2	1 hour 15 min	70 marks	Topics 22 - 24