

# Combined Science Paper 2 HIGHER

## Biology

These specification points will be the **major focus** of this paper.

Spec point	Concepts	CGP revision guide pages	Bitesize	YouTube
<b>4.5.3</b> Hormonal Control in Humans	<ul style="list-style-type: none"> <li>-definition of 'hormone'</li> <li>function of the tissues and organs of the endocrine system</li> <li>-identifying position of glands, and the hormones secreted from them</li> <li>-hormones involved in control of blood glucose concentration</li> <li>-Type 1 and Type 2 diabetes</li> <li>-explain how glucagon interacts with insulin in a negative feedback cycle to control blood glucose (sugar) levels in the body.</li> <li>-describe the roles of hormones in human reproduction, including the menstrual cycle</li> <li>-explain the interactions of FSH, oestrogen, LH and progesterone, in the control of the menstrual cycle</li> <li>-explain the use of hormones in modern reproductive technologies to treat infertility.</li> <li>-explain the roles of thyroxine and adrenaline in the body. Thyroxine levels are controlled by negative feedback</li> </ul>	110 112-115 120	<a href="https://www.bbc.co.uk/bitesize/guides/zq4mk2p/revision/1">https://www.bbc.co.uk/bitesize/guides/zq4mk2p/revision/1</a>	<a href="https://www.youtube.com/watch?v=c6olhi88KZs">https://www.youtube.com/watch?v=c6olhi88KZs</a>  <a href="https://www.youtube.com/watch?v=77oyUdNZ054">https://www.youtube.com/watch?v=77oyUdNZ054</a>  <a href="#">GCSE Biology Hormones in human reproduction (AQA 9-1) – YouTube</a>  <a href="#">GCSE Science Revision Biology "The Menstrual Cycle" – YouTube</a>  <a href="#">GCSE Science Revision Biology "Hormones to Treat Infertility" – YouTube</a>  <a href="#">GCSE Science Revision Biology "Negative Feedback" – YouTube</a>

<b>4.7.2</b> Organisation of an ecosystem	<ul style="list-style-type: none"> <li>-interpret food chains and webs</li> <li>-identify producers, consumers, predators and prey from food chains and webs</li> <li>-describe the carbon and water cycles</li> </ul>	157-160	<a href="https://www.bbc.co.uk/bitesize/guides/zqskv9q/revision/1">https://www.bbc.co.uk/bitesize/guides/zqskv9q/revision/1</a>	<a href="https://www.youtube.com/watch?v=dRFQ8rZCK6Q">https://www.youtube.com/watch?v=dRFQ8rZCK6Q</a>  <a href="https://www.youtube.com/watch?v=urzpnjwazV0">https://www.youtube.com/watch?v=urzpnjwazV0</a>
<b>4.7.3</b> Biodiversity and the effect of human interaction on an ecosystem	<ul style="list-style-type: none"> <li>-Define biodiversity</li> <li>-Describe ways in which pollution can occur, and the impacts of this pollution on biodiversity</li> <li>-Describe ways to manage this pollution</li> <li>-describe some of the biological consequences of global warming.</li> <li>-Describe the things that scientists have introduced to reduce the negative effects of humans on ecosystems and biodiversity.</li> </ul>	163-166 169-170	<a href="#">Biodiversity and interdependence - Biodiversity and the effect of human interaction on ecosystems - AQA - GCSE Combined Science Revision - AQA Trilogy - BBC Bitesize</a>	<a href="#">GCSE Science Revision Biology "Biodiversity" – YouTube</a>  <a href="#">GCSE Science Revision Biology "Maintaining Biodiversity" – YouTube</a>  <a href="#">GCSE Biology - How Human Waste Reduces Biodiversity - Explained #63 – YouTube</a>  <a href="#">GCSE Science Revision Biology "Global Warming" - YouTube</a>
<b>Required Practical 7:</b> 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	<ul style="list-style-type: none"> <li>-Using transects and quadrats are used by ecologists to determine the distribution and abundance of species in an ecosystem.</li> <li>-Understand the terms mean, mode and median</li> <li>-Calculate arithmetic means</li> </ul>	157-158	<a href="https://www.bbc.co.uk/bitesize/guides/zqskv9q/revision/3">https://www.bbc.co.uk/bitesize/guides/zqskv9q/revision/3</a>	<a href="https://www.youtube.com/watch?v=2MW6nwf80XM">https://www.youtube.com/watch?v=2MW6nwf80XM</a>  <a href="https://www.youtube.com/watch?v=RhMOCxXcDrQ">https://www.youtube.com/watch?v=RhMOCxXcDrQ</a>  <a href="https://www.youtube.com/watch?v=yLHz2Ea10Mg&amp;t=2s">https://www.youtube.com/watch?v=yLHz2Ea10Mg&amp;t=2s</a>

These specification points will **not be assessed** on this paper.

Spec point	CGP Revision Guide Pages
4.5.2 The human nervous system	105
4.5.3.4 Contraception	117
4.6.1.1 Sexual and asexual reproduction 4.6.1.3 DNA and the genome	122-124
4.6.1.4 Genetic Inheritance 4.6.1.5 Inherited Disorders 4.6.1.6 Sex Determination 4.6.2 Variation and Evolution 4.6.3. The development of understanding of genetics and evolution	126-150
4.7.1.4 Adaptations	155
4.7.3.3 Land Use 4.7.3.4 Deforestation	167

These areas **may still be assessed** in multiple choice questions/linked to a previous answer, so cannot be completely ignored in your revision.

Content	CGP Revision Guide Pages
Homeostasis	104
Meiosis	125
Classification	148
Competition and Abiotic/Biotic Factors	151-153

# Chemistry

These specification points will be the **major focus** of this paper.

Spec point	Concepts	CGP revision guide pages	Bitesize	YouTube
<b>5.6.1</b> Rate of Reaction	<ul style="list-style-type: none"> <li>-Calculating the rate of a reaction</li> <li>-Calculate the gradient of a tangent to the curve on these graphs as a measure of rate of reaction at a specific time.</li> <li>-Describe collision theory</li> <li>-Define activation energy</li> <li>-Describe and explain the factors that increase the rate of reaction</li> <li>-Describe and explain the effect of catalysts on rate of reaction</li> </ul>	253-260	<a href="https://www.bbc.co.uk/bitesize/guides/zpkp7p3/revision/1">https://www.bbc.co.uk/bitesize/guides/zpkp7p3/revision/1</a>	<a href="https://www.youtube.com/watch?v=UkrBJ6-uGFA">https://www.youtube.com/watch?v=UkrBJ6-uGFA</a>  <a href="https://www.youtube.com/watch?v=GCR5xeduq2o">https://www.youtube.com/watch?v=GCR5xeduq2o</a>  <a href="https://www.youtube.com/watch?v=-4HXaUBbv04">https://www.youtube.com/watch?v=-4HXaUBbv04</a>  <a href="https://www.youtube.com/watch?v=hel8fQjxcO8">https://www.youtube.com/watch?v=hel8fQjxcO8</a>
<b>Required Practical 11:</b> investigate how concentration affects the rates of reaction by a method involving measuring the volume of a gas produced/change in colour	<ul style="list-style-type: none"> <li>-identify independent, dependent and control variables</li> <li>-describe how to measure the dependent variable</li> <li>-analyse results and draw conclusions from graphed data</li> <li>-calculate rate of reaction from data</li> </ul>	258-259	<a href="https://www.bbc.co.uk/bitesize/guides/zpkp7p3/revision/6">https://www.bbc.co.uk/bitesize/guides/zpkp7p3/revision/6</a>	<a href="https://www.youtube.com/watch?v=N5p06i9ilmo">https://www.youtube.com/watch?v=N5p06i9ilmo</a>  <a href="https://www.youtube.com/watch?v=Gl6LVI7oAlU">https://www.youtube.com/watch?v=Gl6LVI7oAlU</a>
<b>5.6.2</b> Reversible reactions and dynamic equilibrium	<ul style="list-style-type: none"> <li>-Identify and give examples of reversible reactions</li> <li>-Apply the conservation of energy to reversible reactions</li> <li>-Define dynamic equilibrium</li> <li>-Describe Le <u>Chatelier's</u> principle</li> <li>-Describe and explain the effect of changing the following conditions on equilibrium; concentration, temperature, pressure</li> </ul>	263-265	<a href="https://www.bbc.co.uk/bitesize/guides/z32bpbk/revision/1">https://www.bbc.co.uk/bitesize/guides/z32bpbk/revision/1</a>	<a href="https://www.youtube.com/watch?v=66qcNNJFy6E">https://www.youtube.com/watch?v=66qcNNJFy6E</a>  <a href="#">GCSE Science Revision Chemistry "Concentration and Reversible Reactions" – YouTube</a>  <a href="#">GCSE Science Revision Chemistry "Pressure and Reversible Reactions" – YouTube</a>  <a href="#">GCSE Science Revision Chemistry "Temperature and reversible reactions" – YouTube</a>  <a href="#">GCSE Chemistry - Le Chatelier's Principle #42 (Higher Tier) – YouTube</a>

Spec point	Concepts	CGP revision guide pages	Bitesize	YouTube
<b>5.7.1</b> Carbon compounds as fuels and feedstock	<ul style="list-style-type: none"> <li>-describe crude oil as a mixture of different length hydrocarbons</li> <li>-define the term hydrocarbon</li> <li>-identify the first 4 alkanes from their chemical formula and name them</li> <li>-Describe the trend in properties as hydrocarbon chain length increases</li> <li>-Describe and explain the process of fractional distillation</li> <li>-describe the process of cracking</li> <li>-describe the use of alkenes</li> </ul>	267-270	<a href="https://www.bbc.co.uk/bitesize/guides/zxd4y4j/revision/1">https://www.bbc.co.uk/bitesize/guides/zxd4y4j/revision/1</a>	<a href="https://www.youtube.com/watch?v=CX2IYWggEBc">https://www.youtube.com/watch?v=CX2IYWggEBc</a>  <a href="https://www.youtube.com/watch?v=3I7yCkSXPos">https://www.youtube.com/watch?v=3I7yCkSXPos</a>  <a href="https://www.youtube.com/watch?v=7AWwjKbRa_o">https://www.youtube.com/watch?v=7AWwjKbRa_o</a>
<b>5.8.1</b> Purity, formulations and chromatography	<ul style="list-style-type: none"> <li>-Define the term pure substance in chemistry</li> <li>-Use melting and boiling point data to identify pure and impure substances</li> <li>-Define the term formulation and give examples</li> </ul>	273 275	<a href="https://www.bbc.co.uk/bitesize/guides/zp2wrwx/revision/1">https://www.bbc.co.uk/bitesize/guides/zp2wrwx/revision/1</a>	<a href="https://www.youtube.com/watch?v=3oJxWwcnfJY">https://www.youtube.com/watch?v=3oJxWwcnfJY</a>
<b>Required Practical 12:</b> investigate how paper chromatography can be used to separate and tell the difference between coloured substances.	<ul style="list-style-type: none"> <li>-Describe the properties of the mixtures that chromatography can be used to separate</li> <li>-Describe and explain the experimental process of chromatography</li> <li>-Explain how substances are separated using chromatography</li> <li>-Interpret chromatograms +</li> <li>-Calculate Rf values</li> </ul>	275	<a href="https://www.bbc.co.uk/bitesize/guides/zp2wrwx/revision/3">https://www.bbc.co.uk/bitesize/guides/zp2wrwx/revision/3</a>	<a href="https://www.youtube.com/watch?v=TdJ57SQ6GAQ">https://www.youtube.com/watch?v=TdJ57SQ6GAQ</a>  <a href="https://www.youtube.com/watch?v=pnTGNAfu6GE">https://www.youtube.com/watch?v=pnTGNAfu6GE</a>
<b>5.9.1</b> The composition and evolution of the Earth's Atmosphere	<ul style="list-style-type: none"> <li>-describe the composition of the current atmosphere</li> <li>-describe the composition of the early atmosphere and explain theories of how the early atmosphere formed</li> <li>-explain how the early atmosphere changed to that of the present atmosphere</li> </ul>	278	<a href="https://www.bbc.co.uk/bitesize/guides/z9pk3k7/revision/1">https://www.bbc.co.uk/bitesize/guides/z9pk3k7/revision/1</a>	<a href="https://www.youtube.com/watch?v=t1Z3GlnldLA">https://www.youtube.com/watch?v=t1Z3GlnldLA</a>  <a href="https://www.youtube.com/watch?v=I0h_-3M0Pso">https://www.youtube.com/watch?v=I0h_-3M0Pso</a>
<b>5.10.1</b> Using the Earth's resources and obtaining potable water	<ul style="list-style-type: none"> <li>-Describe the renewable and non-renewable resources that we get from the Earth and its atmosphere</li> <li>-Define the term potable water</li> <li>-Describe how potable water can be produced.</li> <li>-Describe the differences in the treatment of waste water, salt water and ground water</li> <li>-Describe and evaluate alternative methods of extracting metals e.g. <u>phytomining</u> and bioleaching</li> </ul>	286 292-294	<a href="https://www.bbc.co.uk/bitesize/guides/zswfxfr/revision/1">https://www.bbc.co.uk/bitesize/guides/zswfxfr/revision/1</a>  <a href="https://www.bbc.co.uk/bitesize/guides/zg6cfcw/revision/1">https://www.bbc.co.uk/bitesize/guides/zg6cfcw/revision/1</a>  <a href="#">Biological methods of metal extraction - Higher - Ways of reducing the use of resources - AQA - GCSE Combined Science Revision - AQA Trilogy - BBC Bitesize</a>	<a href="https://www.youtube.com/watch?v=-XczTGavTZU">https://www.youtube.com/watch?v=-XczTGavTZU</a>  <a href="https://www.youtube.com/watch?v=n7pYRQs20bl">https://www.youtube.com/watch?v=n7pYRQs20bl</a>  <a href="https://www.youtube.com/watch?v=b5RVPauf4oM">https://www.youtube.com/watch?v=b5RVPauf4oM</a>

**Exam date: 20<sup>th</sup> June**

This specification points will **not be assessed** on this paper.

Spec point	CGP Revision Guide Pages
<b>5.8.2 Identification of common gases</b>	274

These areas **may still be assessed** in multiple choice questions/linked to a previous answer, so cannot be completely ignored in your revision.

Content	CGP Revision Guide Pages
Climate Change and Greenhouse Gases	280
Carbon footprint Air Pollution	282-284
LCA and Recycling	287-289

# Physics

Higher paper 2		
MAJOR FOCUS		Revision Pages
<b>6.5.1 Forces and their interactions</b>	<ul style="list-style-type: none"> <li>• Scalar quantities – magnitude only (mass, time, temperature, speed, distance)</li> <li>• Vector quantities – magnitude and direction (weight, force, velocity, acceleration, displacement)</li> <li>• Contact forces – objects physically touching – friction, drag, tension, normal contact force</li> <li>• Non-contact forces – not touching – magnetism, gravity, electrostatic force</li> <li>• Mass is constant, weight is the force acting on a mass due to gravity, with weight and mass being directly proportional</li> <li>• Weight = mass x gravitational field strength (<math>W = m \times g</math>)</li> <li>• Multiple forces acting on an object can be replaced by a single, resultant force</li> <li>• Describe example of forces acting on objects</li> <li>• Draw free body diagrams (arrows to represent forces)</li> <li>• A single force can be broken into two forces acting at right angles</li> <li>• Multiple forces can be resolved into a single resultant force using scale vector diagrams</li> </ul>	347-349
<b>6.5.4.1 Describing motion along a line</b>	<ul style="list-style-type: none"> <li>• Explain difference between distance (scalar) and displacement (vector)</li> <li>• Explain difference between speed (scalar) and displacement (vector)</li> <li>• Typical values (all can vary)               <ul style="list-style-type: none"> <li>○ Walking <math>\approx 1.5</math> m/s</li> <li>○ Running <math>\approx 3</math> m/s</li> <li>○ Cycling <math>\approx 6</math> m/s</li> <li>○ Sound in air <math>\approx 330</math> m/s</li> </ul> </li> <li>• For object moving at constant speed, distance can found using distance = speed x time (<math>s = v \times t</math>)</li> <li>• Motion in a circle involves constant speed but change in velocity due to change in direction (i.e. car going around roundabout)</li> <li>• A journey in a straight line can be represent by a distance-time graph</li> <li>• Speed can be found from the gradient of the distance-time graph</li> <li>• If the object is accelerating (curved line) speed can be found by drawing a tangent</li> <li>• Acceleration = change in velocity/time (<math>a = \frac{v-u}{t}</math>)</li> <li>• Acceleration can be calculated from gradient of velocity-time graph</li> <li>• Distance travelled can be calculated by finding the area under a velocity-time graph – this can be found by counting squares or using geometry</li> <li>• <math>(\text{Final velocity})^2 - (\text{initial velocity})^2 = 2 \times \text{acceleration} \times \text{distance}</math> (<math>v^2 - u^2 = 2 \times a \times s</math>)</li> <li>• Falling objects accelerate due to force of gravity. Eventually weight = drag, resultant force = zero and object reaches terminal velocity</li> </ul>	356-360
<b>6.5.4.2 Forces, accelerations and Newton's laws of motion</b>	<ul style="list-style-type: none"> <li>• Newton's First Law: If the resultant force acting on an object is zero and:               <ul style="list-style-type: none"> <li>○ Object is stationary, it remains stationary</li> <li>○ Object is moving, it continues moving at same velocity</li> </ul> </li> <li>• Velocity only changes if force acts on object</li> <li>• Tendency of objects to continue in state of rest or uniform motion called inertia</li> <li>• Newton's Second Law: acceleration is proportional to resultant force</li> <li>• Force = mass x acceleration (<math>F = m \times a</math>)</li> <li>• Inertial mass – measure of how difficult it is to change velocity of object (ratio of force over acceleration)</li> <li>• Newton's Third Law – when two objects interact, they exert an equal and opposite force on each other</li> </ul>	362-363
<b>6.5.5 Momentum</b>	<ul style="list-style-type: none"> <li>• Momentum = mass x velocity (<math>p = m \times v</math>)</li> <li>• Momentum before/after collision is always the same</li> </ul>	Not in guide

<b>6.6.2 Electromagnetic waves</b>	<ul style="list-style-type: none"> <li>• All EM waves are transverse, travel at speed of light (<math>3 \times 10^8</math> m/s) in vacuum or air</li> <li>• Grouped by wavelength/frequency</li> <li>• In order, from long wavelength (low frequency) to short (high frequency) – radio, micro, infra-red, visible, UV, x-ray, gamma)</li> <li>• Different materials absorb/reflect/transmit/refract EM waves in different ways</li> <li>• Refraction is due to waves slowing down/speeding up</li> <li>• Refraction diagrams – less dense to more dense, moves towards normal – more dense to less dense, moves away from the normal</li> <li>• Light slows down when it moves into more dense medium/speeds up when moves into less dense</li> <li>• Radio waves – produced by oscillations in electronic circuits. When absorbed, cause AC current with same frequency as wave.</li> <li>• UV/X-ray/Gamma – can have hazardous effect on human tissue, depending on size of dose/type of radiation.</li> <li>• Radiation measured in Sieverts – 1000 milli Sievert (1000 mSv) = 1 Sievert (1 Sv)</li> <li>• UV can cause skin to age prematurely and lead to skin cancer. X-ray/gamma both ionising – can cause cancer/mutation of genes.</li> <li>• Uses of EM spectrum <ul style="list-style-type: none"> <li>○ Radio – TV and radio</li> <li>○ Microwave – satellite, wi-fi, mobile phone, heating food</li> <li>○ Infra-red – electrical heaters, cooking food, IR cameras, remote controls</li> <li>○ Visible light – telescopes, fibre optics</li> <li>○ UV – energy efficient lamps, sun-tan beds</li> <li>○ X-ray &amp; Gamma – medical imaging and treatments</li> </ul> </li> <li>• Explain why each type of EM is suitable for its role</li> </ul>	378-383
<b>6.7.2 The motor effect</b>	<ul style="list-style-type: none"> <li>• When a current flows through a wire a magnetic field is produced around the wire.</li> <li>• Shaping the wire into a solenoid (coil) increases the strength of the magnetic field – the field inside the solenoid is strong and uniform</li> <li>• Adding an iron core increases the strength of the solenoid – this is an electromagnet</li> <li>• When a wire carrying an electromagnet is placed in a magnetic field the field and conductor exert a force on each other – this is the motor effect</li> <li>• Fleming’s left-hand rule show the direction of the force (thumb), field (first finger) and current (middle finger)</li> <li>• Force = magnetic flux density x current x length (<math>F = B \times I \times l</math>)</li> <li>• A coil carrying a current in a magnetic field will rotate – this is the basis of electric motors</li> </ul>	388-389
<b>Required Practical</b>	<ul style="list-style-type: none"> <li>• Investigate how the amount of infra-red radiation absorbed or radiated by a surface depends on the nature of the surface</li> </ul>	381-382
<b>Low Tariff/Linked Topics</b>		
<b>6.5.2 Work done and energy transfer</b>	<ul style="list-style-type: none"> <li>• Work is done on an object when a force causes it to move.</li> <li>• Work done = force x distance (<math>W = F \times s</math>)</li> <li>• 1 joule of work done = 1 Newton metre</li> <li>• Work done against friction causes a rise in temperature</li> </ul>	349
<b>6.6.1 Waves in air, fluids and solids</b>	<ul style="list-style-type: none"> <li>• Transverse – vibrate perpendicular (<math>90^\circ</math>) to direction of energy transfer. Peaks/troughs. Water waves, all electromagnetic waves.</li> <li>• Longitudinal – vibrate parallel to direction of energy transfer. Compressions/rarefactions. Needs particles (mechanical). Sound waves/ultrasound.</li> <li>• Amplitude – distance from rest point of wave to peak.</li> <li>• Wavelength – distance from peak to peak</li> <li>• Frequency – number of waves passing a point per second</li> <li>• Period = <math>1/\text{frequency}</math> (<math>T = 1/f</math>)</li> <li>• Wave speed = frequency x wavelength (<math>v = f \times \lambda</math>)</li> </ul>	371-374

<b>NOT ON EXAM</b>		
<b>6.5.3 Forces and elasticity</b>	<ul style="list-style-type: none"> <li>• Give examples of forces involved in stretching and compressing</li> <li>• Describe difference in elastic and inelastic deformation</li> <li>• Extension of spring is directly proportional to force applied as long of limit of proportionality not exceeded</li> <li>• Force = spring constant x extension (<math>F = k \times e</math>)</li> <li>• Force on spring does work, and elastic store of spring fills</li> <li>• Elastic potential energy = <math>0.5 \times \text{spring constant} \times \text{extension}^2</math> (<math>E_e = 0.5 \times k \times e^2</math>)</li> <li>•</li> </ul>	351-353
<b>6.5.4.3 Forces and Braking</b>	<ul style="list-style-type: none"> <li>• Stopping distance = thinking distance + braking distance</li> <li>• Thinking distance – people naturally having different reaction times, tiredness, drugs, alcohol, distractions, speed of car</li> <li>• Braking distance – adverse road conditions (rain/ice/snow) condition of brakes, condition of tyres, speed of car</li> <li>• When brakes pressed, friction between brakes and wheel transfers energy from kinetic store to thermal store (car slows, brakes get hot)</li> <li>• Large deceleration can lead to brakes overheating/loss of control of car</li> </ul>	368-369
<b>6.7.1 Permanent and induced magnetism, magnetic forces and fields</b>	<ul style="list-style-type: none"> <li>• Magnets have north and south poles</li> <li>• Poles are where magnets are strongest</li> <li>• North &amp; north/south &amp; south repel</li> <li>• North &amp; south attract</li> <li>• Permanent magnet – has own magnetic field</li> <li>• Induced magnet – becomes a magnet when placed in magnetic field. Always causes force of attraction. Loses magnetism quickly when removed from magnetic field</li> <li>• Region around magnet where force acts is called magnetic field – strength of field depends on distance from magnet</li> <li>• Direction of field line is north to south</li> </ul>	386-387