**Year 10 Triple Science Delivery 2022-23**

**What is the Year 10 Separate Sciences curriculum aiming to achieve?**

**AQA Combined Science (Trilogy) GCSE specification is delivered to all year 10 students during 11 timetabled lessons. All students were given the opportunity to opt to follow Separate Sciences during the spring term of year 9. The three Separate Science specifications will be delivered through five additional timetabled lessons a fortnight each year.**

**In Year 10 each student will receive Biology, Chemistry and Physics lessons together with Working Scientifically lessons a fortnight. In the Working Scientifically lessons, students will have the opportunity to extend their learning in Combined Science lessons through extended practical investigations whilst revisiting and developing their disciplinary skills. The number of lessons per subject area will change over the two years to ensure all three Science specialisms receive an equal number of lessons across the two GCSE years.**

| Autumn 1 | Biology | Chemistry | Physics |
|---|---|---|---|
| Topics | **Infection and response**<br>a)Monoclonal antibodies and their uses<br>b)Plant diseases | **Bonding & Properties**<br>a) Explain trends in group 1 & 7<br>b) Describe properties of transition metals<br>c) Nanoscience and the application of nanoparticles | **Static Electricity**<br>What causes static electricity<br>Electric fields |
| Threshold Concepts | a)Describe how monoclonal antibodies are produced and ways they can be used<br>b)Explain how plant diseases can be detected and give some physical and chemical plant defences | a) Describe and explain trends in melting point, reactivity and density<br>b) Describe properties of transition metals and compare to those found in group 1<br>c) Compare dimensions of nanoparticles and explain the effect on SA:V ratio<br>d) Discuss applications of nanoparticles and their advantages and disadvantages | Describe how friction causes electrons to transfer<br>Draw the electric field pattern for a sphere and describe how it's strength changes with distance |
| Skills | Ethical implications of using animals in medicine | Analyse and observe trends to predict properties of unknown elements<br>Calculate ratios | Record observations and draw conclusions from evidence. |
| Working Scientifically | Which is the most effective antibiotic? | | |
| Opportunities to show progress | Successful completion of investigation | Successful completion of investigation | Successful completion of investigation |

| Autumn 2 | Biology | Chemistry | Physics |
|---|---|---|---|
| Topics | **Homeostasis and response**<br>a)Control of water and nitrogen in the body<br>b)Control of body temperature | **Material Science**<br>a) Materials and their properties (ceramics, polymers and composites)<br>b) Rusting and prevention of corrosion<br>c) Alloys and their uses | **Nuclear Physics**<br>Nuclear in medicine and dangers<br>Fission and Fusion |

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|---|---|---|---|
| Threshold Concepts | b)Describe the role of the kidney in producing urine and controlling water balance<br>b)Explain how body temperature is monitored and regulated | a) Compare the properties of materials (ceramics, polymers and composites) and relate these to their uses<br>b) Define corrosion and describe rusting<br>c) Describe ways to prevent corrosion<br>d) Describe Alloys (bronze, gold, steel and aluminium), their uses and benefits over pure metals | Describe how nuclear radiation can be used for medical treatment<br>State what nuclear fission is and describe a chain reaction<br>Explain where the suns energy comes from |
| Skills | Dissection skill development using the kidney | | |
| Working Scientifically | | Investigating the strength of different polymers | Investigating how resistance of a thermistor changes with temperature |
| Opportunities to show progress | Autumn triple topic test | Autumn triple topic test | Autumn triple topic test |

| Spring 1 | Biology | Chemistry | Physics |
|---|---|---|---|
| Topics | **Homeostasis and response**<br>a)The brain and eye | **Resources**<br>a) Fertilisers (NPK)<br>b) Titration method of analysis | **Particle model and Pressure** |
| Threshold Concepts | a)Describe the regions of the brain and how brain damage is investigated<br>b) Explain the structure of the eye and how eye defects can be corrected | a) Recall the name of salts created from phosphate rock<br>b) Describe NPK fertilisers and compare the industrial production with the lab preparations of these compounds<br>c) Describe and carry out a titration procedure to produce a viable fertiliser in the lab. | The effect of changing the temperature, pressure, volume of a gas when all other variables are kept constant |
| Skills | Dissection skill development using eyeballs | Titration methods and risk analysis | |
| Working Scientifically | Investigating how surface area effects the speed of diffusion in agar and how temperature effects the speed of active transport in yeast | Introduction to titrations | |
| Opportunities to show progress | | | |

| Spring 2 | Biology | Chemistry | Physics |
|---|---|---|---|
| Topics | **Homeostasis and response**<br>Describe plant tropisms and commercial uses of plant hormones | **Quantitative Chemistry**<br>a) Carry out advanced calculations involving solids, solutions and gases.<br>b) Carry out titrations of strong acids and alkalis | **Waves**<br>Sound waves<br>The uses of ultrasound<br>Seismic Waves |
| Threshold Concepts | a)Describe plant tropisms and commercial uses of plant hormones | a) Explain and calculate the percentage yield and atom economy for given reactions.<br>b) Calculate concentrations of strong acids and alkalis using titration methods<br>c) Calculate gas volumes from mass and relative formula mass | How changes in velocity, frequency and wavelength are inter-related in the transmission of sound waves from one medium to another.<br>Define ultrasound waves and explain how these are used to form images.<br>Describe how echo sounding is used to detect objects in deep water<br>Compare the two types of seismic wave produced by earthquakes |
| Skills | RP 8 The effect of light on the growth of newly germinating seeds | RP 2 - determination of the reacting volumes of solutions of a strong acid and a strong alkali by titration | Analyse oscilloscope images |
| Working Scientifically | | | Investigating the critical angle of different materials |
| Opportunities to show progress | Spring triple topic test | Spring triple topic test | Spring triple topic test |

| Summer 1 | Biology | Chemistry | Physics |
|---|---|---|---|
| Topics | **Ecology 1**<br>c)Food security<br>d)Farming techniques<br>e)Sustainable fisheries | **Energy**<br>a) Fuel Cells and their uses.<br>b) Hydrogen fuel cells | **Waves**<br>Reflection and refraction of light |
| Threshold Concepts | c) Describe different levels of food security<br>d) Explain how farming techniques can be more efficient<br>e) Explain how fish stocks can be maintained | a) Describe what a simple cell and battery is and how they produce electricity<br>b) Describe why some cells are rechargeable (or not) and evaluate use of cells<br>c) Describe fuel cells and compare to cells and batteries.<br>d) Describe the overall reaction in a hydrogen fuel cell and write the half equations occurring at each electrode | Draw the reflection of a wave at a surface by constructing ray diagrams<br>Describe a wave's ability to be reflected, absorbed or transmitted at the boundary between two different materials |
| Skills | | | Required practical 9: investigate the reflection of light by different types of surface and the refraction of light by different substances |
| Opportunities to show progress | | | |

| Summer 2 | Biology | Chemistry | Physics |
|---|---|---|---|
| Topics | **Ecology 1**<br>f)Role of biotechnology | Chemical Analysis<br>a) Analysis of anions and cations<br>b) Instrumental analysis of unknown mixtures and formulations | **Waves**<br>Light and Colour<br>Lenses |
| Threshold Concepts | f) Explain how biotechnology can meet population demands | a) Describe the tests for cations (flame tests and the ppt reactions with NaOH)<br>b) Describe the test for anions (halides, sulfates, carbonates<br>c) Carry out analysis of an unknown compound<br>d) Describe instrumental analysis methods to help identify unknowns | Explain how the colour of an object is related to the differential absorption, transmission and reflection of different wavelengths of light by the object<br>Explain why an opaque object has a particular colour<br>State that a lens forms an image by refracting light and describe what the focal length is.<br>Explain images produced by a convex lens can be either real or virtual, concave lens images are always virtual |
| Skills | | RP 7 – Use of chemical tests to identify unknown single ionic compunds | View objects through filters and investigate the difference between transparency and translucency.<br>Construct ray diagrams for both convex and concave lenses |
| Opportunities to show progress | Biology PPE sat in June | Chemistry PPE sat in June | Physics PPE sat in June |