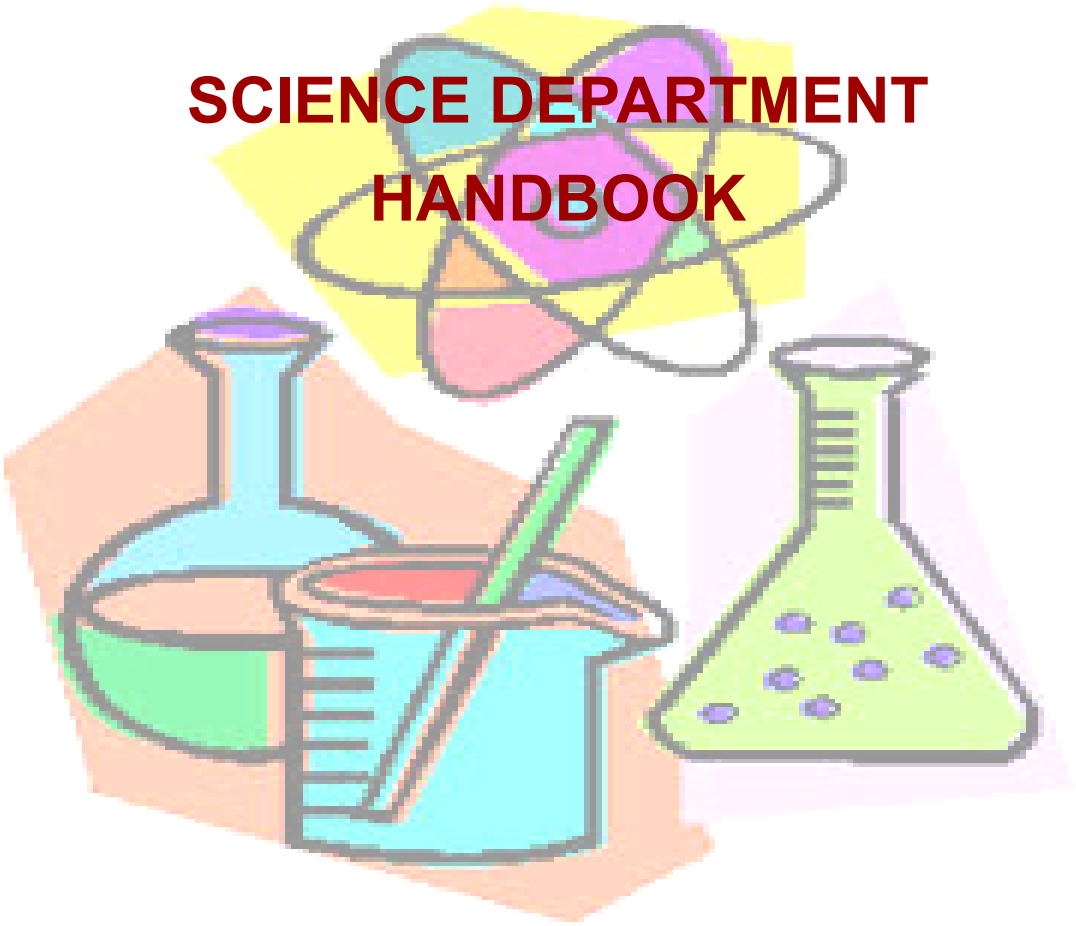
# SCIENCE DEPARTMENT HANDBOOK



**Al-Khair Secondary School**

**Science Department**

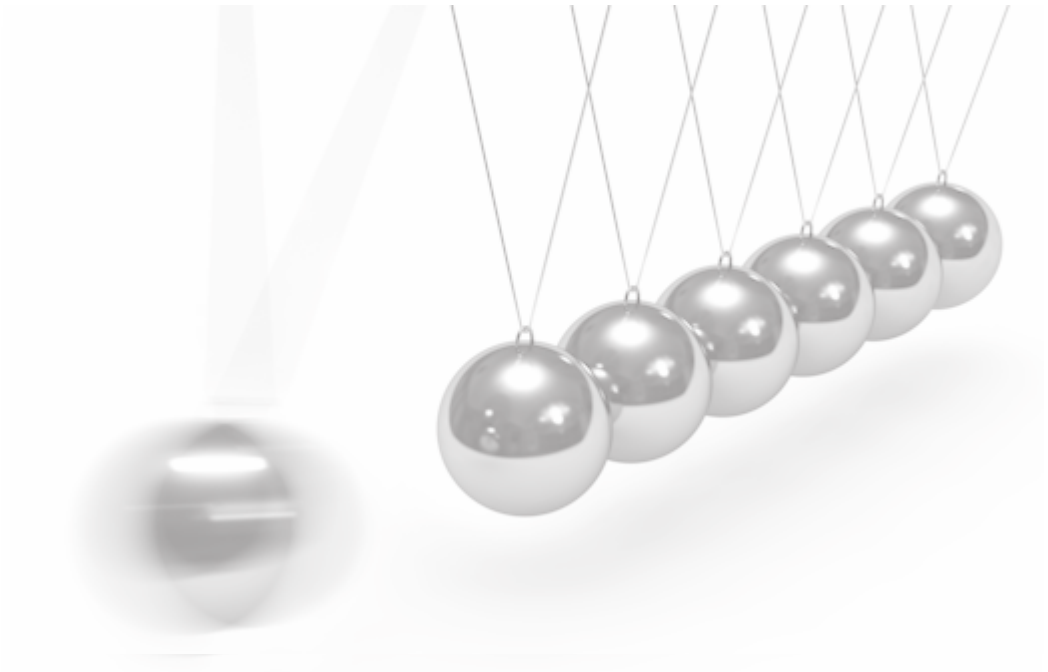
**قسم العلوم**

**Academic Year 2021 – 2022**

**Prepared by**

# Aziza Helaly

## Content



# Introduction to the science Department

**Al-Khair Secondary School**

**Science Department**

**2021 - 2022**

## TEACHING TEAM

**Mrs Aziza Helaly**

Head of Department

KS4 Physics and Chemistry Teacher

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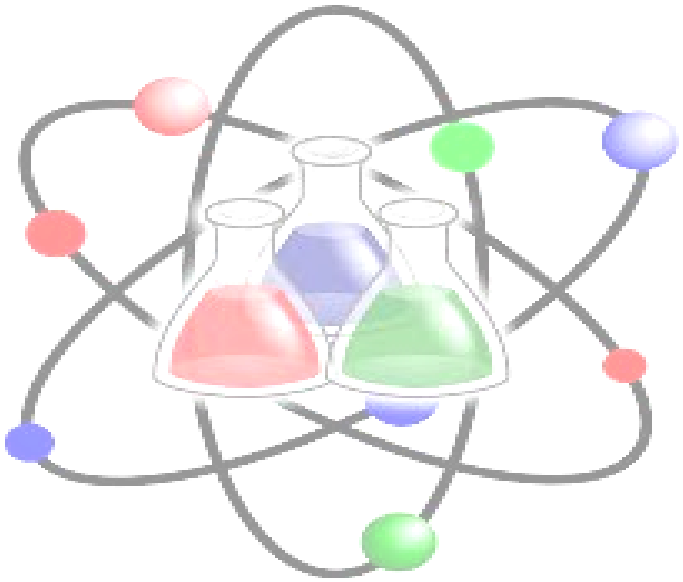


## INTRODUCTION

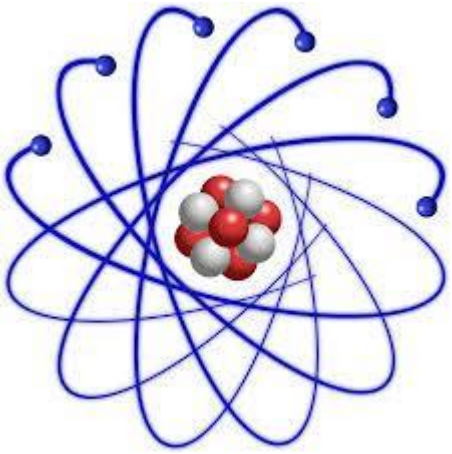
The purposes of this handbook are:

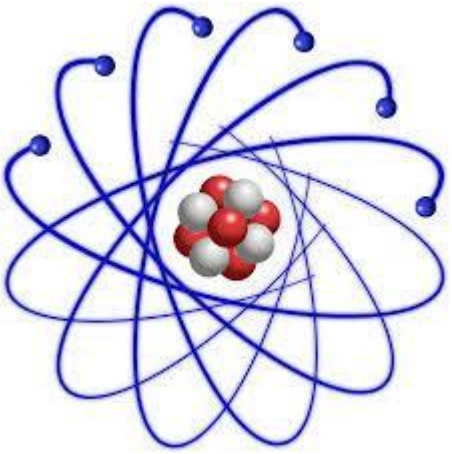
- to provide details of management and organisation of the Department
- to state the policies of the Department
- to provide an overview of the curriculum

## INTENT:

***What is Al-Khair aiming to achieve through its science curriculum?***

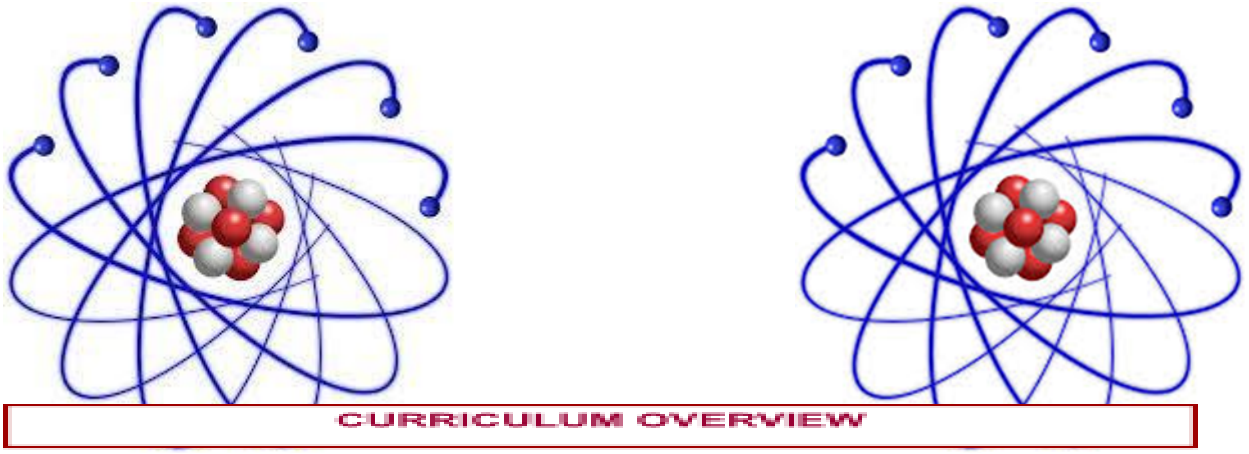
- To develop scientific knowledge and conceptual understanding through the specific disciplines of biology, chemistry and physics
- To develop understanding of the nature, processes and methods of science through different types of science enquiries that help them to answer scientific questions about the world around them
- To understand the uses and implications of science, today and for the future.
- To encourage each pupil to have an appreciation, care and concern for other pupils, animals, plants and the environment,
- To ensure that all pupils receive a broad, balanced, relevant, and differentiated experience of science,
- To educate pupils for a happy and successful life in a society being influenced by rapid scientific and technological change,
- To relate science to other subjects and to real life, and help pupils acquire ecological culture and behaviour,
- To deliver the statutory requirements of the National Curriculum and prepare pupils for public examinations,
- To enable all pupils to achieve their maximum potential.
- To develop the habit of regular revision through reading, watching educational programmes and videos, and completing written tasks including Past Papers to practice exam techniques.
- To inspire students for future STEM careers.
- To link science to pupils' belief in God.





# IMPLEMENTATION

***How is the Al- Khair Science curriculum delivered?***




CURRICULUM OVERVIEW

Science is taught as part of a planned programme, following the requirements of the new National Curriculum 2014. We have KS3 and KS4 Schemes of Work which identify areas to be covered by each year group.

We believe we can offer our children a broad and balanced secondary curriculum which will allow all pupils to build on previous experiences and develop wider concepts or ideas. 'Working and thinking scientifically' must always be taught through and clearly related to substantive Science content in the programme of study

**Key Stage 3: Year 7 and 8**

Students in KS3, will follow the new national curriculum and assessments (https://www.gov.uk/government/publications/national-curriculum-in-england-seconda

ry-curriculum). Each class has 4 science lessons a week. The KS3 curriculum is completed in 2 years. The units the students will study throughout their 2 years are in the following table:

| Year | Term | Winter | Spring | Summer |
|---|---|---|---|---|
| Year 7 | 1st Half Term | • Working scientifically<br>• Cells<br>• Structure and function of body system | • Forces<br>• Sound | • Light<br>• Space |
| | 2nd Half Term | • Particles and their behaviour<br>• Elements, atoms, and compounds | • Reactions<br>• Acid & alkalis | • Studying disease<br>• Reproduction |
| Year 8 | 1st Half Term | • Health and lifestyle<br>• Ecosystem processes | • Electricity and magnetism<br>• Energy | • Motion and pressure<br>• The Earth |
| | 2nd Half Term | • The periodic Table<br>• Separation Techniques<br>• Metals and acids | • Adaptation and inheritance<br>• A healthy heart | • Metals and acids |

## Transition to GCSE - Year 9

Students in year 9, will study the significant overlapping content between Key Stage 3 and Key Stage 4. This will help pupils to consolidate the fundamental skills, processes, and knowledge to be ready for GCSE courses. Each class has 6 science lessons a week.

| Subject | Term | Winter | Spring | Summer |
|---|---|---|---|---|
| Biology | 1st Half Term | • B 1 Cell structure and transport | • B9 Respiration<br>• B7 Non-communicable disease | • B17 Organising an ecosystem |
| | 2nd Half Term | • B3 Organisation and the digestive system<br>• B4 Organising animals and plants expanded | • B13& B14 Genetics, Reproduction, variation, and evolution I<br>• B16 Adaptations, interdependent, and competition | • B8 Photosynthesis |

| | | | | |
|---|---|---|---|---|
| **Chemistry** | 1st Half Term | • C1 Atomic structure I<br>• C2 The periodic table<br>• C3 structure and bonding I | • C7 Energy Changes<br>• B13 The Earth's atmosphere I | • C1 Atomic structure II<br>• C3 The structure and bonding |
| | 2nd Half Term | • C5 Chemical changes | • C14 The Earth's resources<br>• Working Scientifically | • C3 The structure and bonding II |
| **Physics** | 1st Half Term | • P1 Conservation and dissipation of energy I<br>• P2 Energy transfer by heating<br>• P3 Energy resources | • P8 Forces in balance I<br>• P9 Motion | • P 15 Electromagnetism I<br>• P12 Waves properties I |
| | 2nd Half Term | • P3 Energy resources<br>• P6 Molecules and matter I | • P4 Electric circuits I<br>• P 15 Electromagnetism I | • P1 Conservation and dissipation of energy II |

## Key Stage 4:

At Key Stage 4, we will be following the GCSE AQA Science specification http://www.aqa.org.uk/subjects/science. Science is divided into four separate awards: Combined Science: Trilogy (also known as Double Science) then Biology, Chemistry and Physics. Students will either study the triple science and will gain three science GCSEs or will study the Combined Science award worth two GCSEs. All science GCSES will be examined at the end of Year 11.

The subject content and required practicals in combined science are also in the triple science so you have the flexibility to co-teach or to move our students between courses. The selection process for triple science takes place at key points in year 10 and is based on the grades achieved by the student throughout the year. So, by the end of Year 10, students will be studying the GCSE course which best suits their ability. Triple scientists will study the final component of their biology, chemistry and Physics in Year 11. Set positions are reviewed at

the beginning of second term and movement within bands is possible. Some students may move down from triple science at February half term and then no more movement will take place.

## *Biology:*

| Year | Term | Winter | Spring | Summer |
|---|---|---|---|---|
| Year 10 | 1st Half Term | • B8 Photosynthesis<br>• B 1 Cell structure and transport | • B4 Organising animals and plants expanded | • B7 Non-communicable disease<br>• B9 Respiration |
| | 2nd Half Term | • B2 Cell division<br>• B3 Organisation and the digestive system | • B5 Communicable diseases<br>• B6 Preventing and treating diseases | • B10 The human nervous system |
| Year 11 | 1st Half Term | **Separate science**<br>• B3 Organisation and the digestive system<br>• B4 Organising animals and plants expanded<br>• B6 Preventing and treating disease<br>• B7 Non-communicable disease<br><br>**Combined science**<br>• B3 Organisation and the digestive system<br>• B4 Organising animals and plants expanded<br>• B6 Preventing and treating disease<br>• B7 Non-communicable disease | **Separate science**<br>• B13 Reproduction<br>• B14 Variation and Evolution<br>• B15 Genetics and evolution<br><br>**Combined science**<br>• B13 Reproduction<br>• B14 Variation and Evolution<br>• B15 Genetics and evolution | • Revision |
| | 2nd Half Term | **Separate science:**<br>• B5 Communicable diseases:<br>• B9 Respiration:<br>• B10 The human nervous system<br>• B11 Hormonal coordination<br><br>**Combined science:**<br>• B9 Respiration:<br>• B10 The human nervous system<br>• B11 Hormonal coordination<br>• B13 Reproduction | **Separate science**<br>• B15 Genetics and evolution<br>• B17 Organising an ecosystem<br>• B15 Genetics and evolution<br>• B17 Organising an ecosystem<br>• B18 Biodiversity and ecosystems<br><br>**Combined science**<br>• B15 Genetics and evolution<br>• B17 Organising an ecosystem<br>• B18 Biodiversity and ecosystems | • GCSE Exams |

## *Chemistry:*

| | Term | Winter | Spring | Summer |
|---|---|---|---|---|
| Year 10 | 1st Half Term | • C3 The structure and bonding | • C7 Energy Changes<br>• C8 Rates, equilibrium, and organic chemistry | • C12 Chemical analysis |
| | 2nd Half Term | • C4 Chemical calculations I<br>• C6 Electrolysis | • C8 Rates, equilibrium, and organic chemistry (Cont.)<br>• C9 Crude oil | • C12 Chemical analysis (Cont.)<br>• C14 The Earth's resources |
| Year 11 | 1st Half Term | Separate Science<br>• C5 Chemical changes<br>• C7 Energy Changes<br><br>Combined Science<br>• C5 Chemical changes | Separate Science<br>• C12 Chemical analysis<br>• C14 The Earth's resource<br>• C15 Using our resources<br>• Revision | • Revision |

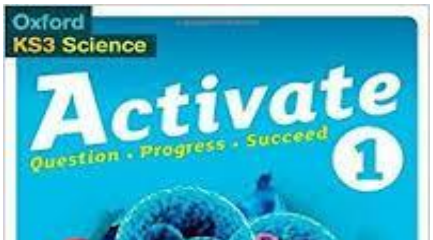
| | | | | |
|---|---|---|---|---|
| | | • C7 Energy Changes | <u>Combined Science</u><br>• Revision | |
| | 2nd Half Term | <u>Separate Science</u><br>• C9 Crude oil and fuels<br>• C10 Organic chemistry<br>• C11 Polymers<br><br><u>Combined science</u><br>• C9 Crude oil and fuels<br>• C12 Chemical analysis<br>• C14 The Earth's resource | <u>Separate Science</u><br>• C2 The periodic table<br>• C3 The structure and bonding<br>• C4 Chemical calculations<br>• C12 Chemical analysis<br><br><u>Combined science:</u><br>• Revision | • GCSE Exams |

## *Physics*

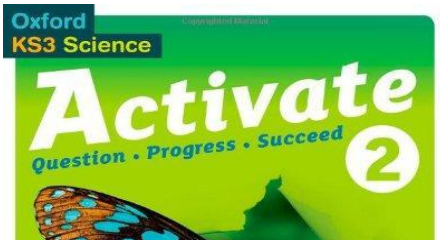
| Year | Term | Winter | Spring | Summer |
|---|---|---|---|---|
| Year 10 | 1st Half Term | • P1 Conservation and dissipation of energy II | • P5 Electricity in the home<br>• P6 Molecules and matter II | • P10 Forces and motion (Cont.) |
| | 2nd Half Term | • P4 Electric circuits | • P7 Radioactivity<br>• P10 Forces and motion | • P12 Waves properties |
| Year 11 | 1st Half Term | <u>Separate Science</u><br>• P8 Forces in balance<br>• P10 Forces and motion<br><br><u>Combined Science:</u><br>• P10 Forces and motion | <u>Separate Science</u><br>P14 Light (Cont.)<br>P 15 Electromagnetism<br>P6 Molecules and matter<br><br><u>Combined science:</u><br>• P6 Molecules and matter | <u>Separate Science</u><br>• P2 Energy transfer by heating<br>• Revision<br><br><u>Combined Science</u><br>• Revision |
| | 2nd Half Term | <u>Triple Science:</u><br>• P11 Forces and pressure<br>• P12 Waves properties<br><br><u>Combined science:</u><br>• P12 Waves properties<br>• P13 The electromagnetic spectrum<br>• P 15 Electromagnetism | <u>Triple Science:</u><br>• P16 Space<br>• P13 The electromagnetic spectrum<br><br><u>Combined Science:</u><br>• Revision | • GCSE Exams |

# Textbook and Teaching resources


KS3 Textbooks and studying resources



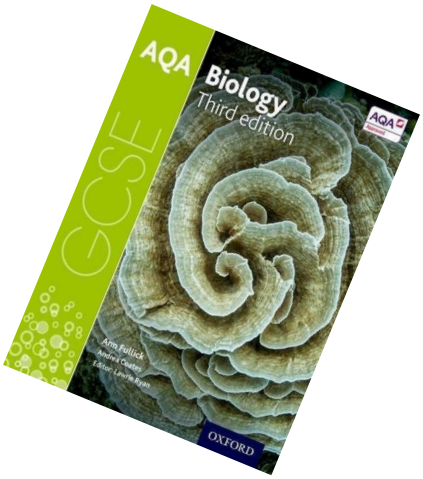


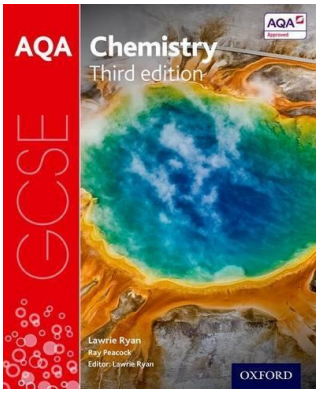



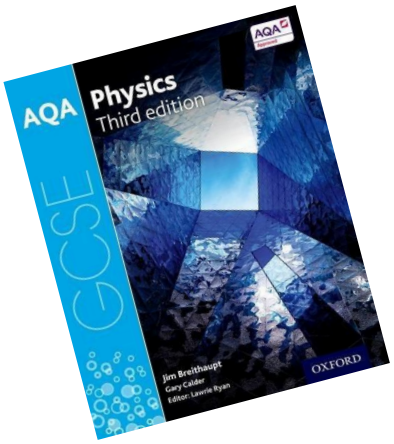
Al-Khair Science Department use Oxford Science students textbook 1, 2 and 3 in KS3. Students also make use of photocopied worksheets for classwork and homework.

KS3 students can use Kerboodle to access digital textbooks, homework sheets, animations, quizzes as well as revision tips and advice. In addition to this students can access activities and tests at http://www.bbc.co.uk/education/subjects/z4882hv and http://links4science.blogspot.co.uk/

## KS4 Textbooks and studying resources








KS4 students will use the Oxford AQA GCSE Biology, Chemistry and Physics textbook.

KS4 students can use Kerboodle to access digital textbooks, homework sheets, animations, quizzes as well as revision tips and advice.

***Useful Revision Resources:***

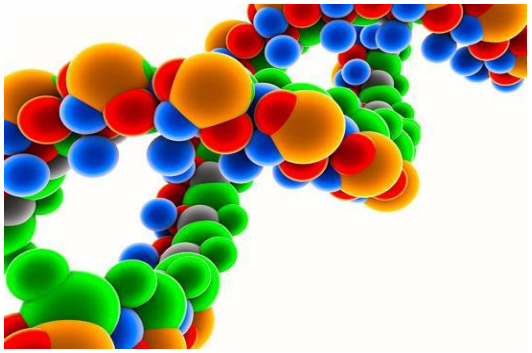
- https://www.physicsandmathstutor.com/
- https://classroom.thenational.academy/subjects-by-key-stage/key-stage-4/subjects/chemistry
- https://www.lbq.org/MyLbQ
- https://www.bbc.co.uk/bitesize/subjects/zrkw2hv
- http://www.gcsescience.com
- www.my-gcsescience.com
- http://www.s-cool.co.uk
- They can also download or view assessment papers and mark schemes from AQA website

  http://www.aqa.org.uk/subjects/science/gcse/combined-science-trilogy- 8464/assessment-resources

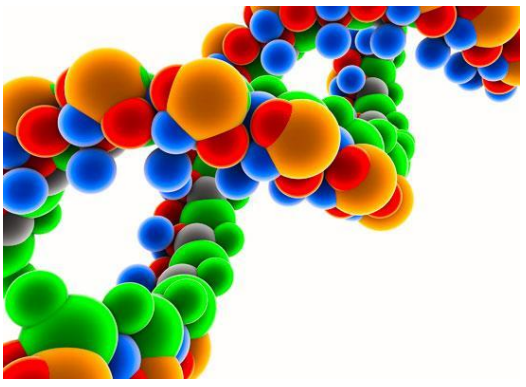
  http://www.aqa.org.uk/subjects/science/gcse/biology-8461/assessment-resources

  http://www.aqa.org.uk/subjects/science/gcse/chemistry-8462

  http://www.aqa.org.uk/subjects/science/gcse/physics-8463



# Department Polices



# Marking, Feedback and Assessment Polices

The Al-Khair Science Department monitors students' progress continuously through a variety of assessment formats, including, practical work, student presentation, coursework, written exercises, group work as well as informal assessment such as question and answer. Students are also formally assessed at the end of each topic, through a content and skills-based exam paper, as well as a termly test covering all topics from that term.

**In KS3 the following skills are assessed:**

- Working scientifically
- Understanding the application and implication of science
- Using investigation approaches
- Working critically with evidence
- Quality of written communication

**In KS4 the following assessment objectives are assessed, which have been set by Ofqual and are the same across all GCSE Science specifications and all exam boards:**

- AO1: Demonstrate knowledge and understanding of: scientific ideas; scientific techniques and procedures.
- AO2: Apply knowledge and understanding of: scientific ideas; scientific enquiry, techniques and procedures.
- AO3: Analyse information and ideas to: interpret and evaluate; make judgements and draw conclusions; develop and improve experimental procedures.

**Marking and Feedback**:

Students will receive regular and detailed feedback on their work. Written feedback outlines the strengths (what went wells) and weaknesses (even better ifs) of a piece of work, and they provide with a personal directed improvement task as a next step in their learning process.
As well as being provided with success criteria for significant tasks, pupils are regularly given the opportunity to self and peer assess work which is useful in helping students to recognise what quality work and answers look like.

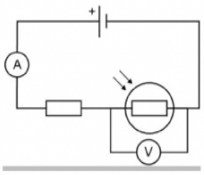
Students are to self or peer-assess work in green pen, teachers are to apply their marking and/or comments in red pen.

**Planning:**

The student builds a different circuit.

**Figure 3** shows the circuit.

**Figure 3**




Explain how the readings on both meters change when the environmental conditions change.

| Success criteria | Level 1: (1-2 marks) | Level 2: (3- 4 marks) | Level 3: (5-6 marks) |
|---|---|---|---|
| | Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking. | Relevant points (reasons / causes) are identified, and there are attempts at logically linking. The resulting account is not fully clear. | Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account. |

WWW.....

EBI.....

**Student improvement:**

**Improved student grade** .....

Furthermore, we are using the following marking and feedback strategies to keep the workload relatively low, while providing meaningful and detailed feedback for the pupils:

- Teacher will create a summary feedback sheet after identifying the strengths and weaknesses based on the whole class work for any piece of work. Pupils can then personalise this by adding their own evaluation.

| www. | EBI |
|---|---|
| Describe the difference between weight and mass.<br>• label a graph to show the forces acting at different stages of free fall<br>• calculate the size of any resultant force and acceleration on a falling body. | • describe how the forces acting on a body affect its motion<br>• explain why some bodies continue to accelerate and some reach terminal velocity<br>• explain the dangers of large decelerations and stopping distances<br>• calculate momentum values and velocity values for moving objects before and after collisions. |

Target to improvement:

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- Students will use RAG sheets at the end of every unit to analyse their assessments and set targets to improve.

**C4 Chemical calculations (Year 10)**

| Score: | Percentage: | Grade: | Target Grade: | Effort: |
|---|---|---|---|---|
| | | | | |

**Feedback**

| Objective | R/A/G |
|---|---|
| I can write down the meaning of the term relative atomic mass. | |
| I can calculate the relative atomic mass of an element. | |
| I can calculate the relative formula mass of a compound. | |
| I can calculate the number of moles, given the mass of substance. | |
| I calculate the mass of substance, given the number of moles. | |
| I can use balanced symbol equations to calculate masses of reactant and product. | |
| I can use balanced symbol equations tell me about chemical reactions. | |
| I can balance an equation, given the masses of reactants and products. | |
| I can explain why a limiting quantity of a reactant affects the amount of product it is possible to obtain. | |

**Comment:**

In light of guidance published by the Government regarding Covid-19, we have added the following to our marking policy to ensure the safety of our whole school community:

- No marking or written feedback during lesson.
- Pupils will self-mark their classwork with guidance from their teacher.
- Teacher will be given verbal feedback (V) instantly to accelerate progress.
- Pupils will be received detailed written feedback in SMHW every 3-4 weeks.
- Assessment papers will be quarantined for 72 hours before making and before handed out to the students.

## Progress Checks and Reporting:

All assessment marks are recorded in SIMs, and on a tracker sheet. Students must have a copy of the science tracking sheet, like the one shown below to the inside front cover of their exercise book.

Year
Formal Assessment Record:

| Name:<br>Subject:<br>Grade at the beginning of the year: | | | | | | |
|---|---|---|---|---|---|---|
| Term | Assessment Number | Units/topics covered | % | Grade | Target | Parent's signature |
| Autumn | 1 | | | | | |
| | 2 | | | | | |
| | 3 | | | | | |
| Spring | 1 | | | | | |
| | 2 | | | | | |
| | 3 | | | | | |
| Summer | 1 | | | | | |
| | 2 | | | | | |
| | 3 | | | | | |

| Presentation expectation |
|---|
| ✓ Every page of your book should be as neat as your first page otherwise you may be asked to re-write it in your own time.<br>✓ Blue or black pen should be used by the student to complete their main work.<br>✓ Notes should be written to indicate these are your notes and will not be marked.<br>✓ There should be a date and title for every piece of work and this should be underlined with a ruler.<br>✓ There should be no graffiti or doodling in any work or on the front of any files. |

| Being a CORE learner | |
|---|---|
| Committed | All work is completed to the best of your ability. Homework is always completed on time and to a high standard and you attend lessons. |
| Optimistic | You demonstrate that you are motivated, confident and successful; you actively participate in lessons by asking questions and seeking help when you do not understand |
| Resilient | You take responsibility for your own learning and you develop powerful partnerships with teachers and students to improve your learning. |
| Enterprising | You demonstrate a real 'love of learning and you are resourceful enough to be successful. |

**Explanation on how to move up the scale is provided in the tables below:**

## KS4 Grade descriptors for GCSEs graded 9 to 1:

| Grade 3 - 4 | Grade 5 -6 | Grade 7-9 |
|---|---|---|
| · Demonstrate some relevant scientific knowledge and understanding using limited scientific terminology<br>· Perform basic calculations<br>· Draw simple conclusions from qualitative or quantitative data<br>· Make basic comments relating to experimental methods | · Demonstrate mostly accurate and appropriate knowledge and understanding and apply these mostly correctly to familiar and unfamiliar contexts, using mostly accurate scientific terminology<br>· Use appropriate mathematical skills to perform multi-step calculations<br>· Analyse qualitative and quantitative data to draw plausible conclusions supported by some evidence<br>· Evaluate methodologies to suggest improvements to experimental methods, and comment on scientific conclusions | · Demonstrate relevant and comprehensive knowledge and · understanding and apply these correctly to both familiar and unfamiliar contexts using accurate scientific terminology<br>· Use a range of mathematical skills to perform complex scientific calculations<br>· Critically analyse qualitative and quantitative data to draw logical, well-evidenced conclusions<br>· Critically evaluate and refine methodologies, and judge the validity of scientific conclusions |

## KS3 Grade descriptors:

| Grade 1/ 2 | Grade 3/4 | Grade 5/6 |
|---|---|---|
| · Use simple models to show situations.<br>· Point out areas of our lives that involve science.<br>· Use simple scientific words to explain ideas.<br>· Select the right equipment for a practical.<br>· Suggest ways to improve a practical. | · Understand how scientists use ideas and evidence to develop or suggest new theories.<br>· Identify uses of different scientific ideas in different jobs.<br>· Use correct scientific language to communicate ideas.<br>· Take measurements or observations during a practical and identify potential risks.<br>· Draw conclusions from data presented in different ways.<br>Explain processes and suggest solutions to problems by using Scientific models.<br>· Indicate how scientific or technological developments may affect groups of people.<br>· Explain why people working together can lead to improved collection of evidence.<br>· Repeat sets of observations or measurements selecting suitable ranges.<br>· Use results to see how good a method was and suggest improvements. | · Describe how scientists share their ideas about evidence.<br>· Explain how scientific developments have led scientists to ask and answer new questions.<br>· Decide whether it is better to show information in a qualitative or quantitative way.<br>· Plan practicals and identify variables which are dependant and independent.<br>· Suggest scientific reasons for anomalies or why data has certain limitations.<br>·<br>·<br>·<br>·<br>· |

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# Homework Policy

Homework is an integral part of the learning process. It can contribute to raising achievement for the following reasons:

- It develops independent learning
- It Improves skill level e.g. research, extended writing, project completion, personal time/work management, organisation.
- It consolidates classroom learning
- It enhances knowledge and understanding

All homework will be uploaded on Showmyhomework. Students will not be expected to do any homework for the next day unless it's up on the website before 5 pm. If it's not on showmyhomework then students will not be expected to do it. This is of course does not include revision for tests and for any other assessments; students should not be waiting for teachers to tell them to start revising.

Students can access showmyhomework without a password but with the addition of password will get more detailed information. Parents and guardians can also link their account to their children. Please contact the school if you don't know how to do this.

The homework that is set can take many forms. It may include activities such as:

- Written assignments
- Revision
- Preparing for an oral presentation
- Individual research
- Collecting materials
- Answering past examination questions
- Finish off work not completed in class
- Prepare work for following lesson.
- Create revision resources
- Creating their own exam/assessment questions
- Think of six questions you could ask on a topic
- Learn key words

- Long term project
- Quiz

Teachers will mark homework and give feedback as soon as possible after submission of work. Students will mark some of their homework. This allows them the opportunity to analyse their responses in a more immediate manner.

Techers will address non-completion, or poor quality of homework. Detention in order to complete the work is one possibility

## GCSE Required practical

The way practical skills are assessed is changing. GCSE Students won't be assessed by ISAs anymore. Instead, they'll do a series of required practical activities. Then the GCSE exams will assess their practical skills. Questions in the written exams will draw on the knowledge and understanding students have gained by carrying out the required practical activities. These questions will count for at least 15% of the overall marks for the qualification. Many of our questions will also focus on investigative skills and how well students can apply what they know to practical situations often in novel contexts. Students will be given a required practical workbook for each science subject.

## Culture Capital and British values

We aim to construct a curriculum that is designed to give all pupils, the knowledge and cultural capital they need to succeed in life.

The examples below summarise the way in which we may seek to embed the Spiritual, Moral, Cultural, Social and Physical Development and Fundamental British Values throughout teaching:

## Spiritual Development in Science:

· Encouraging pupils to form their own opinions rather than just accepting taught ideas.
· Showing respect for differing opinion.
· Using evidence to make sense of the world e.g., studying of the process of evolution by natural selection.
· Considering new discoveries that came from experimentation and exploration of the world that then inspires awe and wonder.

· Looking for meaning and purpose in natural and physical phenomena

· Discussion of the origins of the earth and life in terms of evolution study and how the scientific view differs from that of major world religions.

## Moral Development in Science

· Students are taught that decisions in science are made based on evidence (not prejudice).
· Students are taught to be both open minded (generating a hypothesis) and critical (demanding evidence).
· Students are taught that Scientific discoveries and inventions need to be used responsibly.
· Considering the need for accuracy and precision, reliability and repeatability in experimental Science.
· Considering and discussion of ethical aspects of scientific research and discovery e.g., environmental impact of industry, the political and economic concerns surrounding the carbon cycle, recycling and sustainability.
· Considering and discussion the ethics behind certain medical treatments and the impact and considerations of embryonic testing, new drug production, stem cell research, IVF and fertility treatment etc.
· Assessing the advantages and disadvantages of biofuels.
· Discussion the science of climate change and the impact of human activity on the environment, and Loss of biodiversity.
· Looking at the peer-reviewed and ethically monitored scientific process.
· Explore the moral and ethical issues surrounding Biofuels, nuclear and fossil fuel.

· Students are taught the advantages and disadvantages of the nuclear Fission and fusion, advantages

· Looking at the se of fertilisers and their ecological impact.

## Social Development in Science

· Practical work develops social skills such as team-working, cooperation, using resources effectively and thinking about safe practices.
· Students are encouraged to share the scientific investigations' results to improve reliability.
· Considering that what we do today that will impact on our future and on future generations e.g., the long-term health effect of the chemical used to make everyday products.
· Students are encouraged to debate on the best methods to minimise the environmental impact e.g., different methods of generating the electricity.
· Considering the positive and negative social impact of science and technology upon our everyday lives e.g. x rays, vaccination, fertilisers, GM crops, renewable energy sources and stem cell research.
· Understanding that science has a major effect on the quality of our lives.
· Development of communication skills through discussions, paired and group work, and formal presentations.

## Cultural Development in Science

· Appreciating scientific discoveries as a part of our culture e.g., Isaa Newton, Charles Darwin discoveries.

· Studying some of science's most important discoveries that have come from other cultures e.g., Marie Curie, James Watson, Dmitri Mendeleev discoveries.

· Understanding the importance of collaboration in science e.g., the development of the periodic table.

· Understanding that environmental issues are central to science.

· Making students aware of what they as individuals can do, as well as how the government has policies and laws to tackle air pollution.

· Considering the Environmental impacts of fossils fuels and problems of renewables fuels.

· Understanding and discussing the causes of global warming, and the effects of different countries on global emissions

## Personal Development in Science

· Introducing a variety of science-related jobs by highlighting the different careers that are related to topics taught e.g., electricity and magnetism: Electrician, Electrical Engineer, Power Plant Operator, Electrical Line Worker, Mechanic, Robotics.

· Encouraging students to pursue careers in science by display posters of a range of science careers in the science laboratory.

· Build students' confidence using a range of strategies and activities e.g., present research or investigations findings, independent learning, self, and peer assessment.

· Development of communication skills through discussions, paired and group work, and formal presentations.

· Allow students to experience science in action past and present e.g., visits to British natural history museum, Science Museum, Royal observatory.

· Encourages pupil to read around what they have learned and develop a love and deeper understanding of science.

· Make science lessons relevant to daily life.

· Participation in events such as British Science Week.

· Students are taught how to conduct lifecycle assessments and use of Earth's resources.

## Physical Development in Science

Development the physics knowledge, understanding and skills through teaching the following topics.

- healthy diet
- Heart rate and exercise
- Healthy lifestyles
- Digestion and how the body works
- Breathing rates

## Protected Characteristics

· Adapting science lessons to meet pupils' learning needs and styles.

· Adjusts science lesson plans based on students' assessment evaluations.

· Celebrating National Women in Engineering Day.

· Students are taught the topics in biology:

- Human reproduction organ.
- Changes at puberty.
- Human reproduction.
- Personal hygiene and preventing spread of diseases.
- Menstrual cycle and hormones.
- Hormonal and non-hormonal method of contraception.
- Fertilisation and variation.
- Infertility treatments.
- How sex is inherited.

## Promoting British Values

**Democracy – Making decisions together:**

· Democracy is taught through student debates in issues such as:

- Methods of energy production
- The recycling of aluminum drinks can
- Development and use of chemicals
- Mining metal ore, is it right to destroy/damage the environment to extract resources that are needed.
- Whether smoking and drinking should be made illegal etc.
- Stem cell legislation.

· Making students aware that scientific collaboration is inherent upon the democratic process whereby evidence and conclusions undergo peer review by fellow Scientist.

· Democracy is practised through allowing students to take a role in the delivery of some lesson elements as young leaders.

· Encourage respect for democracy by investigating the right and wrongs of nuclear weapons and the use of different energy sources for power stations.

· Encourage respect for democracy by investigating right and wrong through processes of water purification

**The rule of law – Understanding why rules are important:**

· Making students aware of the impact that scientific evidence has on the law and government acts and policies e.g. human stem cell research

· Understand the importance of the government's policies and laws to tackle some issue such as: air pollution, problem of overfishing.

· Following laboratory rules for the safety of all, and using of hazard symbols and risk assessment.

· Understand that the law protects citizens by ensuring adequate safety legislation is in place, with a particular focus on Nuclear power station.

· Recognising right and wrong through a deeper understanding of drugs, alcohol and the need for legislation.

· Know that there are consequences if rules are not followed e.g., legal and illegal drugs, drug testing in sport, calculating the cost of electricity - Bill paying, car safety and the use of air bag and side impact bars, calculating the cost of electricity - Bill paying.

**Individual liberty – Freedom for all:**

· Students make choices when planning an investigation

· Evaluating the limitations that culture and society place on scientific developments such as: as cloning, IVF and fertility treatments, stem cells, screening embryos

· Evaluating the impact of a variety of medical procedures on patients such as spreading disease, diet and exercise, vaccinations, using x-rays, ultrasound, CT scanning.
· Assessing the advantages and disadvantages of using hydrogen as a new fuel alternative, fuel cell technology and development of this.
· Accepting responsibility for their own behaviour through the human impact on the environment, particularly global warming.

· Understanding the consequences of our actions and how communities' function by debating the impact of quarrying, comparing fuels for power stations and the mining of metals.

**Mutual respect – Treat others as you would want to be treated:**

· Practical activities in science require students to engage in teamwork and show mutual respect for each other.
· Encourage students to respect and value the opinions of others.
· Respect for public institutions and services, e.g., the NHS and organ translations, IVF and Stem Cell research.

· Considering the impact of some industrial processes on the environment such as: the production of ammonia during the Haber process.

· Considering the Environmental problems of burning fuels, and how pollutants can affect the local community as well as the World.
· Understanding some ways of reducing the use of fuels to limit impact on resources and environment.
· Development of biofuels as a resource that is cleaner for the environment than other fuels due to the added oxygen.

· Considering the environmental issues of metals extraction that can affect the world (Global warming, acid rain etc)

· Evaluate the use of artificial hearts and heart valves
· Evaluate the advantages and disadvantages of treating kidney failure by dialysis or kidney transplant.
· Evaluate the different methods of producing Ethanol (one from a renewable source and another from a non-renewable source.

**Tolerance of those with different faiths and beliefs – learning about different faiths and culture:**

· Students study variation and inheritance and learn individual differences between humans and other animals.

· Recognise and appreciate the importance of diversity and understanding both ecological and cultural perspectives on life.

· Students discuss different changes that occur in different people at different times and how hormones can affect individuals differently.

· Religious beliefs often compete with scientific understanding

· Students look at organ transplantation in terms of life changing benefits and reasons why/why not someone would choose to be on the organ donor register.
· Evaluate modern methods of treating diabetes.
· Experience awe and wonder at the different theories on the origins of the Universe.

· The cultural development of science is demonstrated by the evolution of scientific ideas such as Wegener's theory of continental drift.

· Students acquire an appreciation of their own and other cultures by debating different theories of evolution and creationism.

**Extra-curricular opportunities**

- British natural history museum trip.
- Science Museum trip.
- Education visits to Royal observatory trip.
- STEM club
- British Science Week
- L'Oréal Young Scientist Centre – Workshop
- IET Faraday Challenge (Year 8)
- Junior Physics challenge (Year 10) – 29th April – 18th May 2022
- Intermediate physics challenge (Year 11) – 11 March 202
- Engineering Masterclasses, Royal Institution of Great Britain (Year 9)
- Biology Olympiad

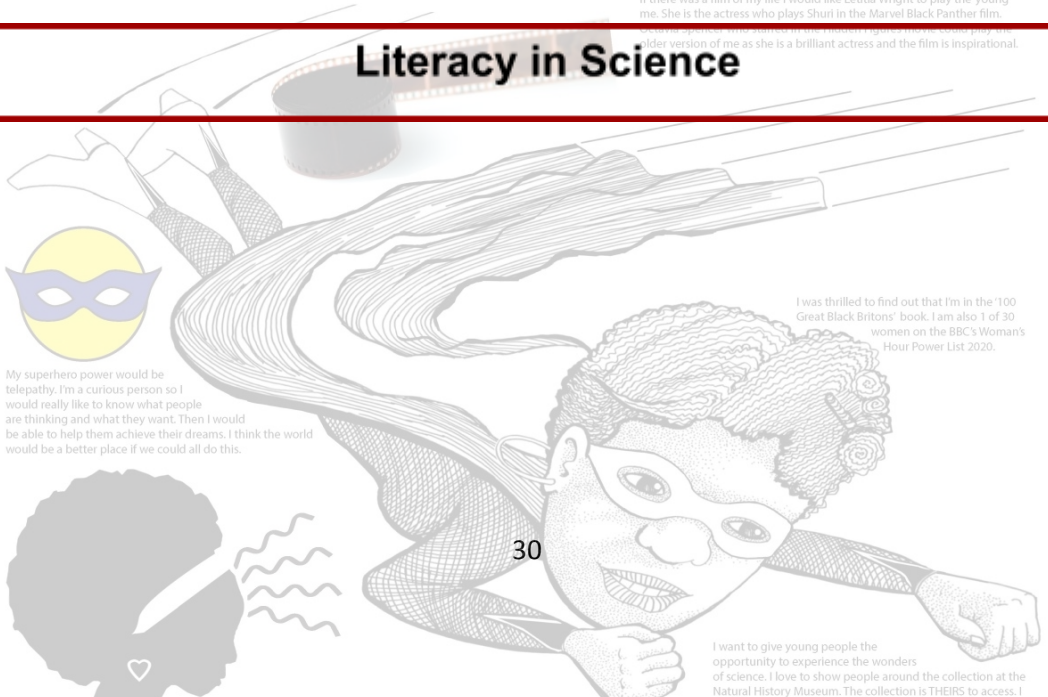
**Recommended books:**

- New Scientist
- all about chemistry by Robert Winston
- National geographic
- Horrible Science
- bad science
- Life on Earth
- Nature Biotech
- How it works (Scientific magazine)

**Recommended Films/videos:**

- Blue planet
- Hidden kingdoms
- Earth Days
- Nature's weirdest events
- Black fish and Grizzly man (Netflix)
- Blue planet I & II Apollo 13 Interstellar
- Brian Cox BBC series in Physics- planets
- Human universe
- BBC Sky at Night Physics World
- Wonders of the universe
- BBC Knowledge Nature
- BBC Horizon Documentaries
- Planet Earth: The complete collection
- The Future of food
- Be the change
- Madame Curie
- Evolution
- Gorillas in the mist GATTACA
- Supersize me
  The imitation game
- The Martian
- The Cove

## Literacy in Science



We are committed to supporting and developing Literacy skills in all our students in the belief that it will help them develop as successful and confident individuals. Student will provide with opportunities to develop their skills within the three elements of the literacy framework:

**Listening and talking for learning**

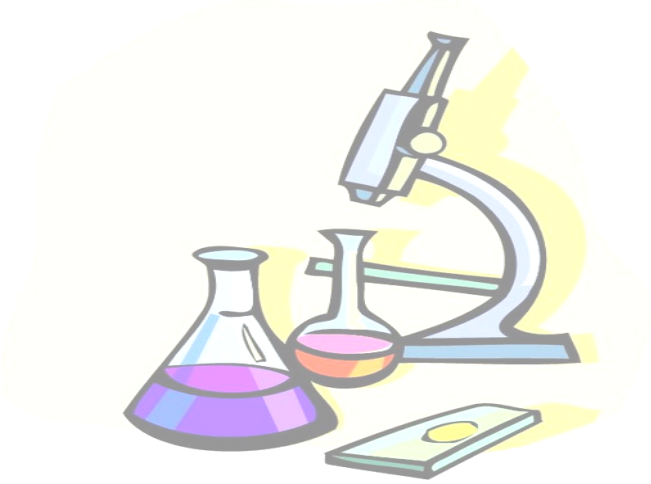
- engage with others in group and class discussions
- learn collaboratively
- explain their thinking to others
- explore factors which influence them and persuade them in order to help them think about the reliability of information

**Reading for learning**

- find, select, sort, summarise and link information from a variety of sources
- consider the purpose and main concerns in texts, and understand the differences between fact and opinion
- discuss similarities and differences between texts

**Writing for learning**

- make notes, develop ideas and acknowledge sources in written work
- develop and use effective vocabulary
- create texts – for example, presentations – which allow learners to persuade/argue/explore ideas



**Merits and Demerits**

The Science Department rewards students with merits for good work and demerits for incomplete work. The two tables below show possible ways to receive merits and demerits.

| Type of Merit | Number of merits |
|---|---|
| | |
| Classwork | 1-2 |
| | |
| Achieved an A* in Assessment | 2 |
| | |

| Type of Demerit | Number of Demerits |
|---|---|
| | |
| Classwork incomplete | 1-2 |
| | |
| Unprepared for lesson | 1 |

Rules for pupils during science lessons

1. You must not do anything with equipment or materials unless told to do so by a teacher. You must follow instructions precisely.

2. You must wear eye protection when told to do so and keep it on until told to take it off when all practical work, including clearing away, is finished.

3. When instructed to use a Bunsen burner, make sure that scarves and ties are tied back or tucked in to keep them well away from the flame.

4. When working with liquids, normally stand up; then you can move out of the way quickly if there is a spill.

5. Never taste anything or put anything in your mouth when in the laboratory unless your teacher tells you to do so. This includes sweets, fingers and pencils, which might have picked up dangerous chemicals from the bench.

6. If small amounts of chemicals or microbiological cultures get on your hands or any other part of the body, wash them off. Wash your hands after work with chemicals or with animal or vegetable matter.

9. Put bags away in the spaces provided.

7. Put waste solids in the correct bin, never in the sink.

8. Report any accident to the teacher. This includes burns or cuts and chemicals in the mouth, the eyes or on the skin.

9. Keep your bench clean and tidy.

## Practical work safety During Covid-19

The following factors will consider when planning for practical work during Covid-19, to ensure that pupils and staff stay safe:

Pupil bubbles are allocated fixed locations where pupils stay for all of their lessons. Therefore, some practical activities will be adapted to the classroom teaching. Examples of potentially suitable activities

- Density of an object activities
- Hooks Law
- Leslie's
- Diffusion activities using household products like perfume
- Use of magnets
- Using a microscope to view pre-prepared slides
- Chromatography practical

Some activities will be avoided (in a lab or classroom) during the Corona virus pandemic for example Cheek cell sampling, Lung volume/ capacity and other breathing-based activities etc.

### Supervising pupils engaged in practical tasks

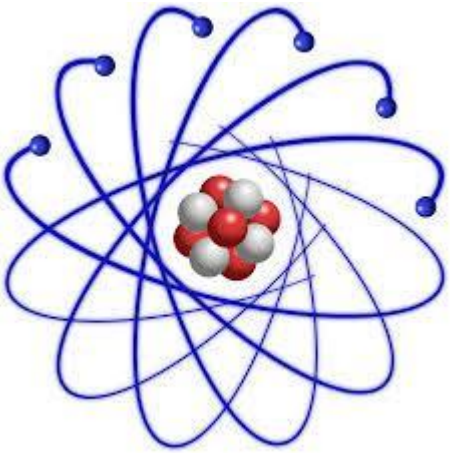
Teachers will maintain a 2m distance when observing pupils as they work through practical activities. If the teacher has concerns about the ability of the pupils to carry out the task safely without direct intervention from her/him. In this case then the teacher will consider a different approach to the activity, an alternative activity or doing a demonstration rather than a hands-on practical.

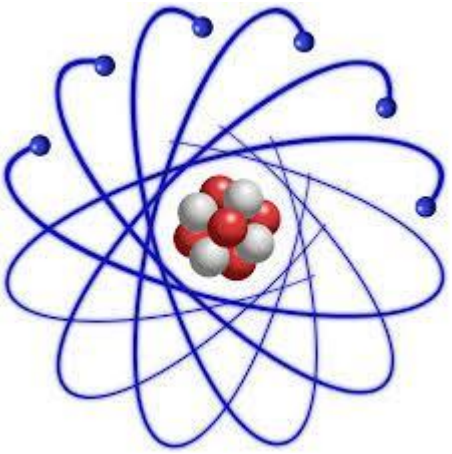
### Management of science equipment

Equipment can be shared by pupils within the same bubble. After every practical, all equipment including the equipment used by the teacher for demonstrations will label and quarantine for 72hr between **every** use **or** sanitising (even with pupils in the same bubble).


### Lab Coats

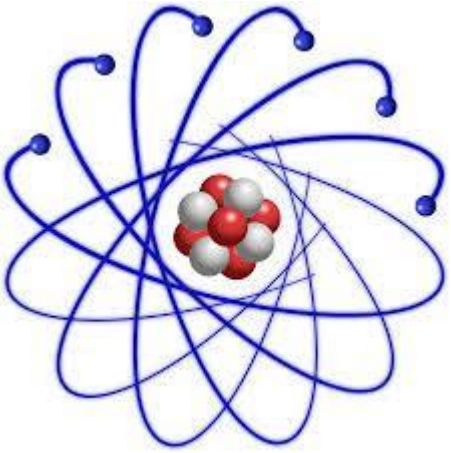
As lab coats are not PPE they are not required for practical work

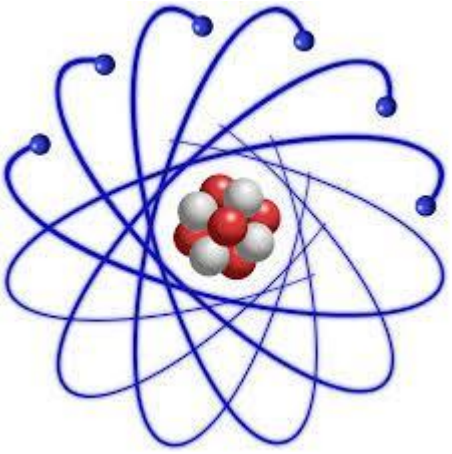




# IMPACT

***What difference is science curriculum making on pupils?***





## IMPACT:

- Most pupils meet or exceed their expected progress in science
- Many pupils join Wallington Grammar School /sixth forms at post- 16 where they study a range of different qualifications and science subjects.
- Many pupils study medicine at St George's University.
- Pupils are well-prepared for the next stage of their education.
- Our triple science GCSE students attain grades consistently above the national average.

## GCSE Examination Results

The table below is shown Al Khair Science Department GCSE examination Results for the last five years.

| Subject | GCSE Result 2017 | | GCSE Result 2018 | | GCSE Results 2019 | | GCSE Results 2020 | | GCSE Results 2021 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | % A* - A | % C - A* | % L7- 9 | %l L4- 9 | % L7 - 9 | % L4- 9 | % L7 - 9 | % L4- 9 | % L7-9 | % L6 -9 |
| Biology | 48 | 100 | 43 | 100 | 31 | 100 | 93.75 | 100 | 100 | 100 |
| Chemistry | 43 | 100 | 57 | 100 | 63 | 100 | 81.3 | 100 | 100 | 100 |
| Physics | 30 | 100 | 57 | 100 | 63 | 100 | 75 | 100 | 90 | 100 |
| Combined science | - | - | - | 100 | - | 100 | - | 100 | 70 | 100 |