SCIENCE DEPARTMENT HANDBOOK

2024-25

ROCKWOOD ACADEMY

"A place where students always come first"

CONTENTS:

Department Vision:

Curriculum intent:

Our vision is to promote a love of learning in Science which enables pupils to understand, enjoy and be fascinated at the world in which we live in. We aim to cultivate curiosity through delivering engaging lessons that challenges thinking. We encourage our pupils to be curious learners and to develop a positive and practical approach to scientific learning. We build understanding of the '*Big Ideas*' in science that are relevant to pupils' lives during and beyond school. *Our purpose is to develop pupils who are equipped with both theoretical knowledge and the practical skills needed to thrive in any STEM-related field.*

At Rockwood Academy we teach our pupils that using critical thinking and evidence to create solutions might be the key to help solve some of the world problems.

Science offers opportunities to work independently at home or with other people performing experiments, to develop the skills of evaluation and analysis. Making links between ideas and understanding the big picture that is the world past, present and future.

Science provides opportunities to develop cultural capital through STEM and wider university links. STEM education is well established at Rockwood Academy and has gone from strength to strength since its introduction in September 2018. The provision offered at Rockwood Academy is led and supported by the Science department. All members of the team are actively involved in delivering the STEM curriculum internally and supporting with the external activities that are pupils are involved with.

Our programme of STEM activities embodies the values of the CORE trust and echoes our school values. We work closely with industry partners as well as FE and HE institutions to support our pupils to acquire the skills base, knowledge and confidence to excel in an increasingly STEM dependent job market.

The aims of our STEM programme are to:

- Develop key life skills in our learners.
- Develop knowledge of STEM in the context of our Science curriculum.
- Improve pupil progression to STEM subjects post 16.
- Increase the appeal of STEM careers amongst females and other underrepresented groups.

Over the last three academic years, the Science team at Rockwood Academy has offered a staggering 56 external STEM opportunities to our pupils. Naturally, the COVID-19 pandemic caused disruption to our STEM enrichment calendar, however where possible we have modified and adapted our plans to offer events in house; for example, our Christmas "Chemistree" show. Following the pandemic, we have now incorporated a range of in-house experiences to ensure all students are offered the chance to engage with STEM.

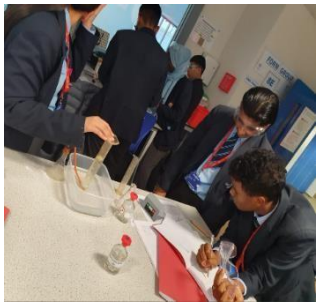
One of the key strengths of the STEM provision at Rockwood Academy, is that we actively work to raise participation amongst our female cohort. Our destinations data shows that each year since 2018, the number of female's pupils pursuing STEM subjects at FE is increasing, with the 2018/19 showing 52% of female pupils entering STEM courses at FE level. This increase in numbers is due to the STEM enrichment programme as well as the opportunities that pupils have to engage with female STEM ambassadors.

Rockwood Academy has also been certified as part of Teach Chemistry from the *Royal Society of Chemistry*, which is an organisation supporting the delivery of inspirational chemistry teaching.

*"Nothing in life is to be feared, it is only to be understood. Now is the time to understand more, so that we may fear less." — **Marie Curie***

CORE values:

COLLABORATION

*"The meeting of two personalities is like the contact of two chemical substances: If there is any reaction, both are transformed." — **C.G. Jung***

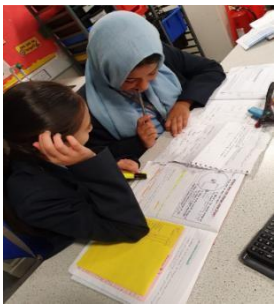
As a practical subject, there is ample opportunity for collaborative work, -whether it's pupils collaboratively planning or pupils working together during science practical's. We continue to work with external provides such as the University of Birmingham & Teach First to form links where subject specialists can deliver bespoke sessions to our pupils.

OPPORTUNITY

*"If I have seen further it is by standing on the shoulders of Giants." — **Isaac Newton***


Pupils at Rockwood thrive as a result of the STEM opportunities provided to them, feedback from pupil voice survey's shows that all pupils see the importance of STEM in the curriculum, in particular they recognise STEM skills will help them access certain jobs & careers as well as *"being aware of the world around us".* Feedback from female pupils highlighted that our pupils felt "**empowered**" & "**confident**" by participating in the programmes; our KS3 girls' also articulated how they felt about the gender imbalance in STEM careers, with one pupil commenting "*STEM should be for **everyone**, I enjoyed having this opportunity*". Breaking down stereotypes around the STEM sector early means that we are more successful in supporting our young men & women ignite their interests in these fields.

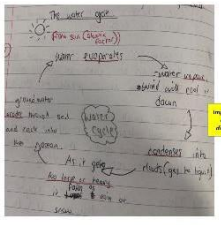
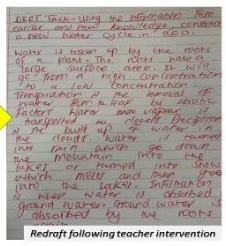
RESPECT

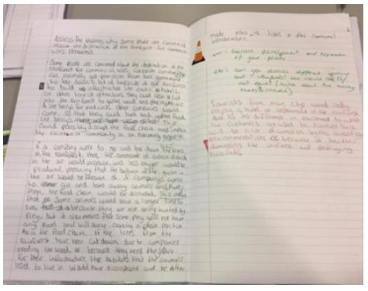



*"The beauty of a living thing is not the atoms that go into it, but the way those atoms are put together." — **Carl Sagan***

Learning in Science encompasses tolerance and respect of different views and opinions. Pupils cover the depth and breadth of curriculum, including evolution, genetic engineering, stem cells and The Human Genome Project. This enables them to grow and develop the skills to be tolerant and reflective members of the local and wider community.

EXCELLENCE

*"You cannot teach a man anything; you can only help him discover it in himself." – **Galileo***

The Science department aims to *raise the aspirations* of pupils and foster a culture where everyone succeeds and achieve to the best of their potential. This is accomplished through promoting positive and safe working environments where pupils are empowered to be confident, creative and outspoken learners.

Curriculum:

Key stage 3: OVERVIEW

Throughout Key stage 3, pupils will study Biology, Chemistry and Physics units. All units include planning investigations, recording and analysing data, drawing graphs, writing conclusions and evaluations. Pupils will also need to use their maths skills in Science lessons. During the course of the year, pupils will also partake in *How Science Works* investigations focusing on science-specific skills. Pupils will regularly review substantive content and disciplinary knowledge throughout their studies.

The Year 7 -9 curriculum is designed to be engaging, contextual and accesible to all pupils and builds the foundations for later study of the sciences as it covers the threshold concepts of all three science disciplines which are revisited in moredetail at GCSE level.

In the summer term of Y9, the students will cover our bespoke transition curriculum. This is a responsive curriculum, the contents of the topics covered in the summer term will be identified through ANAC's and data analysis of PC1 and PC2 assessments.

YEAR 7: Programme of Study

AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
a. Introduction to Science. b. Cells & movement. c. Particles and their behaviour	a. Forces b. Structure & function of body systems c. Atoms, elements and compounds	a. PC1 revision b. Motion and pressure.	a. Reproduction b. Rections	a. Adaptation and inheritance. b. Acids and alkalis	a. PC2 revision b. Space

YEAR 8 Programme of Study

AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER2
a. Health and lifestyle b. Acids and alkalis	a. Adaptation and inheritance b. Separating techniques	a. PC1 revision b. Sound and light	a. Ecosystems b. Metals and acids	a. Electricity and magnetism b. The earth	a. PC2 revision b. Space

YEAR 9 Programme of Study

AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
a. Energy b. Acids and alkalis	a. Cell Biology and diffusion b. PC1 revision c. Atomic structure	a. Health and digestion	a. PC2 revision b. Transition curriculum	a. Transition curriculum	a. Transition curriculum

Key Stage 4 OVERVIEW:

In the GCSE Science curriculum, students will to develop the skills, knowledge and understanding of working scientifically, including:

1 Development of scientific thinking

2 Experimental skills and strategies

3 Analysis and evaluation

4 Scientific vocabulary, quantities, units, symbols and nomenclature

Students will be expected to develop their Scientific enquiry skills and will be expected to have completed specific required practical experiments for each of the Science; Biology, Chemistry and Physics. They will be examined on their understanding and knowledge of these experiments in the exam papers at the end of their GCSE course. In addition to completing these required practical experiments in the classroom, they will be expected to keep a clear record as evidence of having completed them.

Y10 Edexcel Curriculum

Separate Science

Students in Y10 opted for Triple Science as part of their options process. Students will be studying the Edexcel Separate Science curriculum over two years. The Y10 cohort consists of a single class of Separate Science students, in subsequent years we intend to increase this to two groups.

Students will be taught by three separate teachers over eight lessons. In Y10, the Biology & Physics leads will be each allocated 3 hours per week in Y10 & the Chemistry lead will be allocated 2 hours per week. This will be adjusted as the cohort moves into Y11, all changes will be driven by students' performance and data.

Students will sit x2 papers per discipline, each paper is 1 hr 45 minutes in length. The papers are available at foundation tier and higher tier containing a mixture of different question styles, including multiple-choice questions, short answer questions, calculations and extended open-response questions.

Our overview:

Biology	Chemistry	Physics
Triple: SB1- SB5	Triple: SC1- SC15	Triple: SP1- SP6

Breakdown of contents studied in each term:

Specialism	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
Biology *[3 hrs per week]*	SB2: Cell control	SB3: Genetics	SB4: Evolution	SB5: Health and disease	SB6: Photosynthesis	SB8: Exchange and transport
Chemistry *[3 hrs per week]*	SC1/2: States of matter. SC5/6/7: Bonding	SC5/6/7: Bonding	SC8: Acids and alkalis SC9: Conservation of mass	SC10-14: Electrolysis	SC10-14: Electrolysis	SC15: Groups in the periodic table.
Physics *[2 hrs per week]*	SP1: Forces SP2: Forces and motion	SP4: Waves	SP5: Light and EM spectrum	SP5: Light and EM spectrum	SP6: Radiaoctivity	SP6: Radiaoctivity

Combined Science:
The majority of the remaining students in Y10 will cover the Edexcel Combined Science curriculum. Students will cover this programme of study over two academic years, receiving 5 hours of Science teaching per week. The curriculum will be split into the three Science disciplines, with two teachers being appointed to each group. The Biology lead will deliver 3 hours of lessons per week, whilst the Chemistry lead delivers 2 hours. The Physics curriculum will be carefully split between the two lead teachers, to promote effective cross disciplinary skills.

Students will sit x2 papers per discipline. Each exam paper is 1 hr 15 minutes in length, worth 70 marks and count towards 16.7% of the GCSE. The papers are available at foundation tier and higher tier containing a mixture of different question styles, including multiple-choice questions, short answer questions, calculations and extended open-response questions.

Our overview:

Biology	Chemistry	Physics
Combined: CB1- CB5	Combined: CC1- CC10	Combined: CP1- CP6

Breakdown of contents studied in each term:

Specialism	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
Biology *[3 hrs per week]*	CB2: Cell control CB3: Genetics	CB3: Genetics CP4: Waves	CP5: Light CB5: Health and disease.	CP6: Radioactivity	Physics practical skills	Biology practical skills.
Chemistry *[2 hrs per week]*	CC1/2: States of matter and separating techniques	CP1: Forces CP2: Forces and motion	CC5/6/7: Bonding	CC5/6/7: Bonding	CC8: Acids and alkalis	CC8: Acids and alkalis

Foundation transition curriculum:
To support a small cohort of KS4 students to fully access the depth and breadth of the Science curriculum, a bespoke bridging curriculum has been designed to support the transition between KS3 and KS4. Our Entry Level curriculum will be delivered to selected and targeted students, the curriculum covers the fundamental concepts and principles of the three scientific disciplines. The curriculum is designed to provide a foundation in science before students' progress to accessing the full GCSE level curriculum. Students will be assessed via end of topics and course assessments.

Our overview:

Biology	Chemistry	Physics
B1: Cells, Genetics & Inheritance B2: Health & disease B3: Genetics B4: Transporting substances	C1: Atoms, compounds and states of matter. C2: Separating techniques C3: Acids and alkalis	P1: Forces, movement & energy P2: Waves and radiation P3: Work done P4: Electricity & magnetism

Breakdown of contents studied in each term:

Specialism	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
Biology *[3 hrs per week]*	B1 P1	B2 P3	P3 B3	B4	P4	PC2 revision
Chemistry *[2 hrs per week]*	C1	P2	C2	C2	Physics P1-4 practicals Chemistry C1-4	PC2 revision

Y11 Curriculum Triple Science

We teach the Pearson Edexcel GCSE (9-1) Separate Sciences 2 Year route split into the 3 different disciplines (Biology, Chemistry & Physics) that are taught alongside each other by specialist teachers within that area of study allowing crossing-over of ideas, concepts and principles throughout the pupils' academic journey at GCSE level.

Students will be taught by three separate teachers over five lessons. The Biologist is allocated 3 hours per week, whilst the Chemistry & Physics is led by multidisciplinary teachers in 5 hours per week.

Students will sit x2 papers per discipline, each paper is 1 hr 45 minutes in length. The papers are available at foundation tier and higher tier containing a mixture of different question styles, including multiple-choice questions, short answer questions, calculations and extended open-response questions.

Our overview:

Biology	Chemistry	Physics
Triple: SB6-SB9	Triple: SC14-SC26	Triple: SP7-SP15

Breakdown of contents studied in each term:

Specialism	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1
Biology *[3 hrs per week]*	SB7: Hormones and control of metabolic rate	SB9: Ecosystems and nutrient cycles	SB9: Ecosystems and nutrient cycles	Revision: *Cells & control *Genetics *Evolution	Revision: *Health and disease *Photosynthesis
Chemistry *[3 hrs per week]*	SC20/21: Fuels & atmospheric science	SC22/24: Alkanes, carboxylic acids, polymers	SC26/7: Qualitative analysis and nanoparticles	Revision: Paper 1 & 2	Revision: Paper 1 & 2
Physics *[2 hrs per week]*	SP7: Astronomy SP8: Work done & forces	SP10/11: Electricity & static	SP12/13: Magnetism and EM induction SP14: Particle model & foces	Revision: Paper 1 & 2	Revision: Paper 1 & 2

Foundation transition curriculum:

Due to COVID gaps, a small cohort of KS4 students require further subsidiary support in accessing the Science curriculum. As a result, the ELC curriculum has been extended and incorporates the fundamental GCSE content in an accessible approach and depth to support our students in learning key scientific skills. This curriculum offer will be delivered to selected and targeted students. The curriculum is designed to provide a foundation in science before students' progress to completing the full GCSE level curriculum. Students will be assessed via end of topics and cumulative tests.

Our overview:

Biology	Chemistry	Physics
B3: Plants and ecosystems. B4: Human biology	C4: Elements and chemical reactions. C5: Fuels and earth's atmosphere.	P3: Electricity and magnets P4: Energy and particles.

Combined Science

We teach the Pearson Edexcel GCSE (9-1) Separate Sciences 2 Year route split into the 3 different disciplines (Biology, Chemistry & Physics). Students are taught by two teachers over five lessons, with one teacher leading Chemistry (2 hrs) and the other Biology (3 hrs). The Physics curriculum is split amongst the two teachers.

GCSE study in the sciences provides the foundation for understanding the material world. Scientific understanding is changing our lives and is vital to the world's future prosperity. All pupils should learn essential aspects of the knowledge, methods, processes and uses of science. They should gain appreciation of how the complex and diverse phenomena of the natural world can be described in terms of a small number of key ideas that relate to the sciences and that are both inter-linked and of universal application.

The Pearson Edexcel GCSE (9–1) in Combined Science consists of six externally examined papers. These are available at foundation tier and higher tier containing a mixture of different question styles, including multiple-choice questions, short answer questions, calculations and extended open-response questions.

Our overview:

Biology	Chemistry	Physics
Combined: CB6-CB9	Combined: CC8-CC17	Combined: CP7-CP13

Breakdown of contents studied in each term:

Specialism	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1
Biology *[3 hrs per week]*	CB6: Photosynthesis CP9: Electricity	CB7: Hormones CP12/13: Forces and particle model.	CB8: Exchange and transport. CP12/13: Forces and particle model.	CB9: Ecosystems CP10: Electromagnets	Revision: Paper 1 & 2
Chemistry *[3 hrs per week]*	CC9: Conservation of mass. CP7/8: Work done & forces	CC10-13: Electrolysis. CC14-15: Groups and periodic table.	CC14-15: Groups and periodic table. CC16/17: Fuels and atmospheric science.	CC16/17: Fuels and atmospheric science.	Revision: Paper 1 & 2

Assessment:

In the context of building big ideas, assessment of pupils' learning at Rockwood Academy serves two important purposes:

1. To provide feedback that helps teachers to regulate teaching and pupils to direct their efforts more effectively (*formative assessment*)
2. To keep track of pupils' progress towards the various goals of science education (*summative assessment*).

Within our curriculum model we have clear schema building units in each of the Science disciplines. After each unit is delivered, students will complete an end of topic assessment [EOT]. All students assessed cumulatively at two points within the academic year. These will be marked internally, and QLA's will be input on the departmental spreadsheet. There are two cumulative testing periods [CT] in each year.

Within each teaching topic, students will be formatively assessed via low stakes "Retrieval Quizzes" as set by the class teacher. Two quizzes will beinterleaved in each topic. For example:

Y7: Particle model

L1- L4: Teaching of content.
L5: Do Now Activity is "Retrieval Quiz 1"
Teacher to use emerging trends to plan in class interventions/re-teach as required
L5- L8: Teaching of content.
L9: Do Now Activity is "Retrieval Quiz 2"
Teacher to use emerging trends to plan unstructured lessons/consolidation time activities

Assessment at KS3:

Alongside the trust wide cumulative assessment points, Rockwood Academy Science teachers **will** continue to assess students summatively at the end of each topic. Standardised Kerboodle assessments will be used and results will be recorded on the departmental spreadsheet. There are two tiers of assessment available, and students performance will be recorded on a mastery scale as shown below.

Foundation tier	Higher tier
Novice	Novice
Developing	Developing
Securing	Securing
	Extending

Students in Y7- Y9 will complete two progress checking [PC] assessments. The first of which will assess all knowledge covered in the first schema building unit [AUT1- SPR1] and the second will assess content covered throughout the academic years [AUT1-SUM2].

Assessment at KS4:

The assessments in Y10 and Y11 will consist of End of topic papers (EOT's) and mock exams. For each round of mock exams students will sit three written papers, one for each of the Science disciplines.

- All pupils studying Separate Science will be entered for Higher tier. Each exam paper will last 1 hour 45 minutes and will be scored out of 100 marks.
- Pupils entered for the combined science course will sit either Higher or Foundation tier. Each exams lasting 1 hour 10 minutes and will be scored out of 60 marks.
- Students will be graded as per the GCSE 9-1 grading system.
- For progress testing [PC] examinations, students will be provided with a comprehensive QLA of their performance.
- Y10 and Y11 will complete two PC examinations [PC1 and PC2] in the 2024/25 academic year. Each PC assessment will assess the understanding and application of GCSE content that has been taught until the PC point.

Marking & feedback policy:

It is important that as Science teachers we provide constructive feedback to students, both written and orally, focusing on success and improvement needs against learning intentions. This enables students to become more independent, reflective learners, helping them to close the gap between what they can do currently and what we would like them to do. As a result of effective marking and feedback, students will *know more, remember and do more* in their Science lessons.

In Science, marking and feedback should:

- Be manageable for the teachers and accessible to the students.
- Relate to the driving question & learning intention.
- Involve the teaching team working with the students.
- Give recognition and praise for achievement and clear actions for improvement.
- Allow specific time for pupils to read, reflect and respond to marking where appropriate.
- Respond to individual learning needs - taking opportunities to feedback visually/face-to-face where appropriate.
- Inform future planning.
- Use consistent codes to improve literacy across the curriculum.
- Ultimately, be seen by students as a positive approach to improving their learning.

The methodology of marking students' work in Science:
Note: All teacher marking must be completed in green pen, students must respond in red pen.

Oral Feedback:
It is important for all students to have oral feedback from members of the teaching team from time to time. This dialogue should focus upon student successes, areas for development and to set immediate targets/tasks to improve understanding and address any misconceptions. Oral feedback should be accompanied with visualiser work to demonstrate "what a good one looks like [WAGOLL] examples.

Summative Feedback/Marking:
This is associated with closed tasks or exercises where the answer is either right or wrong. The students, as a class or group, should self or peer mark in red pen.

Formative Feedback/Marking:
Not all pieces of work can be quality marked and there is no expectation that teachers should quality mark every piece of work. Teachers should use their professional judgement to decide whether work will simply be acknowledged or given detailed attention. Acknowledgement should always relate to the learning intention.

Marking and feedback given by support staff/Teaching Assistants:
Where a member of the teaching team, other than the class teacher, has been involved in the student's learning, the work should be initialled and commented on where appropriate.

Teachers Quality Marking [Yellow feedback sheet]:
Teachers must quality mark a significant piece of work or assessments once every 8-10 lessons. The work should be quality marked using a yellow feedback sheet [shown below] with appropriately selected tasks. The feedback sheets are a form of whole class feedback, and therefore should not name any individual students.

Teachers should focus first and foremost upon the learning intention/driving question of the task and ensure feedback provided corresponds with the learning intention/driving question. The emphasis should be on successes against the learning intention and/or the improvement needs of the student

When providing *quality yellow sheet* feedback teacher should:

1. Read a cross selection of work from the class OR mark the class assessments.
2. Identify up to 3 examples of where the students have commonly met the learning intention [WWW- What went well]. Using these points devise a focused comment, which will help the student extend future learning.
3. Identify up to 3 examples of where students have commonly **not** met the learning intention [EBI- Even Better If]. Using these points devise a focused comment, which will help the student improve their future learning.
4. Spelling, punctuation and grammar need not be marked in every piece of work. Teachers should take 2-3 spelling errors and ask students to rewrite them correctly 3 times.

When students receive *quality yellow sheet feedback*, they should:

- Spend time assessing what they did well and then look at the task set by the teacher to extend their thinking or attempt the task to show improvement from their original work. Consequently, they should be able to *"know more, remember more, do more"*
- Students' must respond to the DIRT in red pen. Self-marking and evaluation: When required, students should be given time at the start of a lesson, to read and consider the written feedback the teacher has provided (as appropriate).
- Students should be encouraged to ask for clarification, if they do not understand a comment and should be clear about what they need to do in their next piece of work, as a result of the feedback they have received.
- Students should be encouraged, where appropriate, to respond to any additional written feedback, either verbally or by writing a reply.

Example of marking and feedback in Science:

Class	7X/SC4	Date
Topic	REPRODUCTION TEST	25/05/22

WWW:
- ☐ Most students can identify adaptations for seed dispersal.
- ☐ Most students can identify changes that happen in puberty.
- ☐ Some students can identify parts of a flower.

EBI:
- ☐ Students need to know the structures in the female reproductive system.
- ☐ Students need to know what the placenta does.
- ☐ Students need to learn the stages in the menstrual cycle.

Misconceptions/errors
- ***Menstruation is not the same as ovulation.***
- ***Sperm is not the female gamete.***
- ***The menstrual cycle stops when a woman is pregnant.***
- ***Placenta is not a muscle keeping the baby in place, that is the cervix.***

Next Steps in Learning (ANSWER INDEPENDENTLY, IN SILENCE & USING RED PEN)

Re-draft your answer to the 6-mark question using the prompts.

"The weather is a key factor in growing crops. Water is one factor needed for successful germination (growth). Design a practical that will investigate whether the amount of rainfall in an area will affect germination of the seeds in a crop."

To investigate how the amount of .....

affects the.....

you will need to use .....

.....

.....

.....

You need to change .....

.....

You need to measure .....

.....

.....

To make it a fair test, you need to keep .....

.....

..... the same.

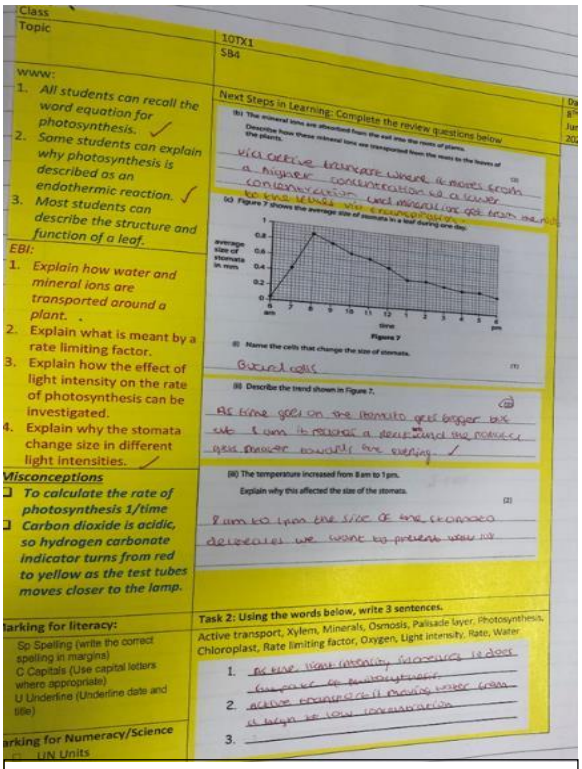
After ..... days, work out the number of germinated seeds by .....

Peer-assessment· **/ 6**

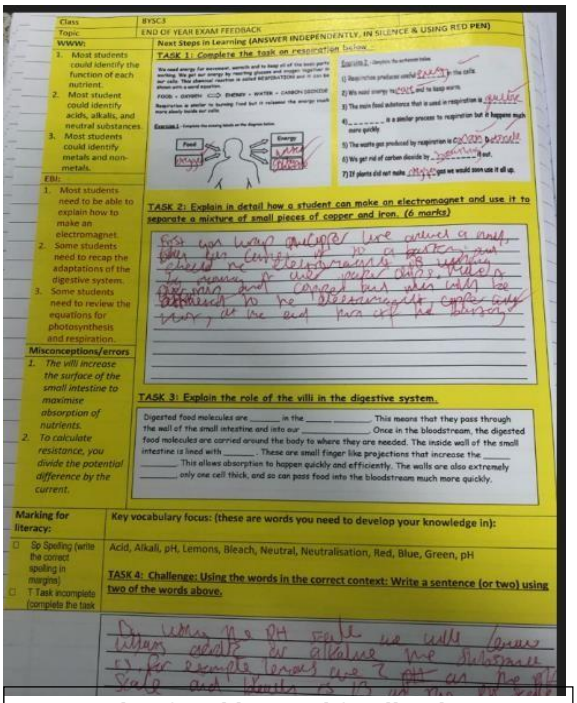
WWW·

EBI·

Marking for literacy:	Key vocabulary focus: (these are words you need to develop your knowledge in:
☐ Sp Spelling (write the correct spelling in margins) ☐ T Task incomplete (complete the task in full using red pen) ☐ C Capitals (Use capital letters where appropriate) ☐ D Date (Add the date to your work) ☐ U Underline (Underline date and title) ☐ ^ missing word (Reread your work and add the missing word)	Placenta – Ovulation – Fertilisation – Function –
Marking for Numeracy/Science ☐ UN Units ☐ W Show Working out	



Example of making and feedback at KS4



Example of making and feedback at KS3

Monitoring and Evaluating this Policy:

The policy will be monitored through further consultation with staff and through the planned reviews. Pupils' workbooks will be monitored by the SLT, TLR holders & Head of Department, during QA visits and book scrutinies; with written and verbal feedback given to individual members of staff.

Literacy in Science policy:

- ***Why is literacy important in Science?***

  Purposefully and systematically improving children and young people's literacy in science is key to narrowing the gap in attainment and participation between pupils from high and low SES backgrounds [EEF, 2017]

- ***What is disciplinary literacy?***

Disciplinary literacy in science focuses on how reading, writing, speaking, and listening are used to develop sense-making in science. It emphasises the content knowledge, experiences and skills, and ability to acquire new knowledge that experts within science disciplines use to apply and generate new knowledge.

- ***How do we incorporate literacy into our Science curriculum at Rockwood Academy?***

As a Science department, we aim to embed literacy in Science through four strands:

- Developing *vocabulary* in science
- Developing *oracy* in science
- Developing *comprehension* in science
- Developing *writing* in science

To achieve this, we have reviewed our departmental practice and approaches to ensure all students are given explicit opportunities to develop in all four categories of Science. Lesson sequences will be customised by the classroom teacher to ensure students are receiving purposeful and meaningful activities to promote their literacy in Science.

1. **Lesson format**: All lessons resources/PowerPoint material, will feature a keyword bank for the lesson. These are carefully selected words which will be taught or reviewed over the course of the lesson. All science teaching classes will have a tier three word of the week; this word has been identified by the class teacher, Explicit reference will be made to the "word of the week" during lessons & where appropriate Do Now & lesson activities will be linked to this keyword.

2. **Medium term plan [MTP]:** All students will be given a medium term plan at the start of each topic. The medium term plan will identify all scientific keywords that will be covered over the course of the topic. This is a useful starting point for classroom support assistants to pre-teach required vocabulary & for students to refer to as they progress through the topic.

3. **Purposeful activities with a literacy focus:** Teachers will design lessons sequences to incorporate explicit opportunities to focus on embedding & enhancing literacy in Science, both in a written and oral format.

4. **Introducing Scientific terminology**: Within Science lessons, literacy is used on a consistent basis with students being given key words and needing to learn their definitions. In KS3 there is a clear focus on acquiring & understanding new scientific terminology which students will continue to use during the rest of their time studying Science. In KS4 students will be building upon the literacy foundations constructed in KS3. During their GCSE course, students will be able to understand what is meant by the command words used in exam style questions, use tier two & three vocabulary in the correct context and be able to decode unfamiliar vocabulary using their prior knowledge.

To effectively embed the new terminology all students will be:

a. Given keyword spelling and definition explaining quizzes on regular basis as part of their AfL checks & Do Now Activities. *These activities will be differentiated according to the needs and ability of students.*

b. Completing appropriate DART [Directed Activities Related to Text] activities to demonstrate understanding through use and modification of the text.

c. **Interpreting images and data,** scientific writing is often accompanied by images (illustrations, photos) and data (tables, graphs).

d. Understanding complex scientific vocabulary [tier 3 words] through reading scientific articles/passages for meaning.

e. Developing as metacognitive learners by incorporating scientific keywords for the lesson or topic in their extended writing tasks. As part of Do Now & plenary activities students will be encouraged to write summaries of their learning using topic keywords.

f. Developing their practical skills by utilising keywords in the correct scientific during verbal discussions.

g. Immediately responding to live feedback/marking to correct any spelling or grammatical errors in their work.

h. Utilising writing scaffolds to plan out their extended written responses.

i. Writing scientific reports, students will be trained in how to write scientific reports and will learn how to structure them properly throughout their scientific learning. A scientific report would normally take the following structure:

- Hypothesis and prediction
- Plan (method)
- Risk Assessment
- Results
- Graphs and data analysis
- Conclusion
- Evaluation

During Key Stage 3 and 4 students will develop a detailed understanding of all of the above terminology and what is expected to be included in each of the sections. During lessons/homework tasks, students will be directed to focus on one or all of these sections during an investigative write up.

When new terminology is introduced to students, the staff member/teacher will utilise one of the strategies below to promote studeny fluency and implicit understanding of scientific vocabulary:

a. Identify & explicitly teach the relevant tier two and three vocabularies as part of the lesson. *[Tier two words are commonly found in an academic book or exam paper, whereas tier three words are subject specific].*
b. Take time to **decode** the terminology and enable students to make sense of the word in a scientific context. *For example, during delivery of the "ecosystems" topic; students will be taught the word photosynthesis is a combination of 'photo' meaning light and 'synthesis' meaning to make and the word is the term for plants using light energy to make glucose.*
c. Use mini whiteboards to check spelling & understanding of keywords.
d. Embed choral responses to check for pronunciation & definitions.
e. Anchor new vocabulary to concrete knowledge or examples.
f. Model pronunciation and contextualisation of new scientific terminology.
g. Design purposeful literacy focussed tasks to incorporate new terminology [concept cartoons, data analysis tasks, word wheel, structure strips, comprehension tasks, use of words banks & extended writing tasks].
h. Provide students with graphic models, scaffolds and writing frames to support the acquisition and embedding of scientific terminology.
i. Use the visualiser to model expectations for literacy tasks & provide feedback on student responses.
j. Incorporate live marking to provide timely feedback on spelling, grammar and writing structure.
k. Select appropriate reading (consider student reading ages) material to read **with** students. Ensure students are clear on **why they are reading it** before they begin the reading and provide students with comprehension questions to consolidate understanding. Assess understanding gained from the comprehension task and intervene where necessary.
l. Develop DART activities to encourage students to actively engage with a task.
m. Promoting etymology *[the study of words],* through spending time helping students to understand the origin of words and their morphology (roots, prefixes and suffixes).
n. Looking at the morphology of key words in science, so students can see how scientific keywords are constructed.

Monitoring and Evaluating this Policy:

The policy will be monitored through fortnightly developmental drop in's, lesson observations & through showcasing good departmental practice. Pupils' exercise books will be monitored by the SLT, TLR holders & the Head of Department during fortnightly QA visits and planned book scrutinies; with written and verbal feedback given to individual members of staff. Student feedback & views on embedding Literacy in Science will be sought during the annual student voice questionnaires.

Teaching Model:

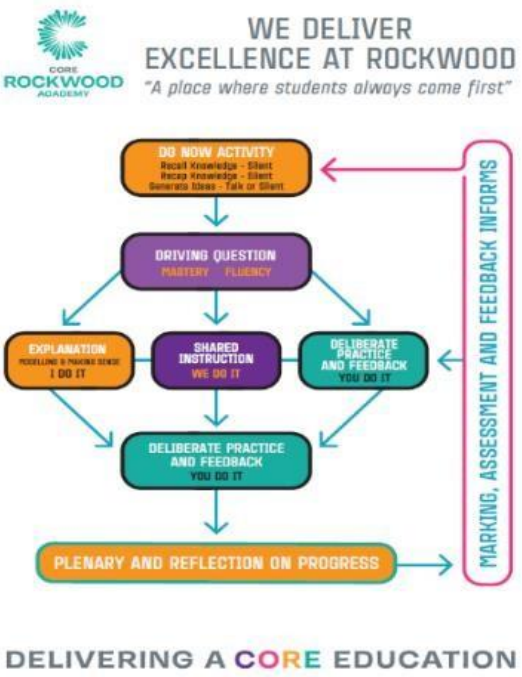
Teaching and learning in Science:

It is important to have a classroom routine & culture which pupils can count on every day. Having the routine procedures and practice every lesson cuts down wasted learning time significantly.

Our classroom routines aim promote a positive environment where all pupils can learn.

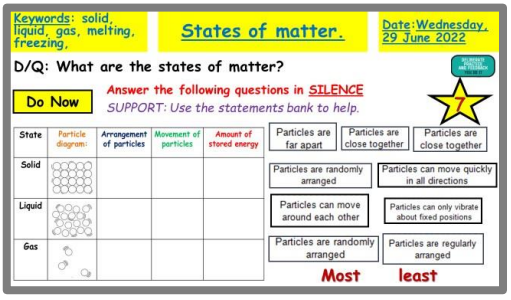
Our daily routines in Science include:

- ✓ High classroom expectations.
- ✓ Meeting and greeting pupils at the door.
- ✓ Having the date, title, driving question and "DO NOW" activity on the interactive whiteboard as pupils walk in and settle.
- ✓ Well planned and sequenced lessons which promote positive engagement from all pupils and lead to clear students' progress
- ✓ As a result of our lessons, students "know more, remember more and do more".

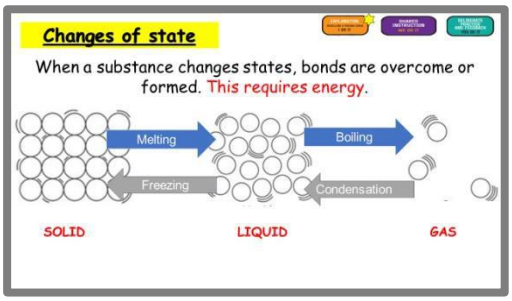


Example of what a typical science lesson would look like at Rockwood:

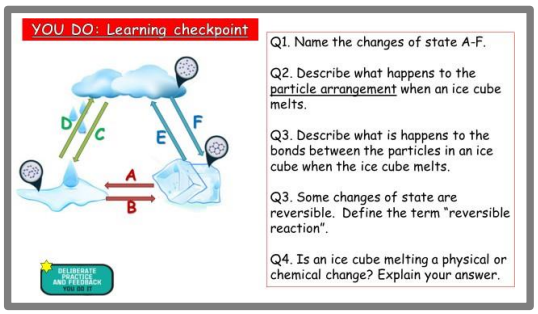
Pupils settle into a silent DO NOW activity at the beginning of the lesson which assess prior knowledge or involves consolidation:



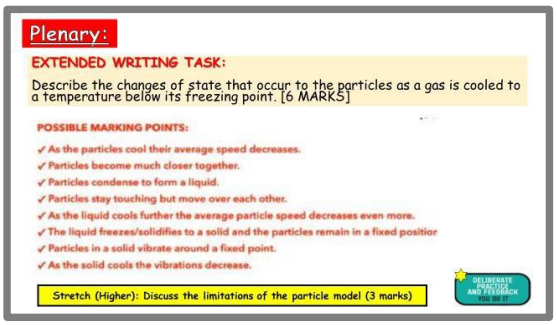
Pupils transition into an "I DO/ WE DO" part to the lesson where the teacher delivers new instruction/theory or ideas. At this stage a practical demonstration may be carried out or pupils may watch a video link followed by a discussion and Q & A:



Pupils will then apply the skills they have acquired to a "YOU DO" activity (mini-plenary/ progress task/assessment for learning (AfL)) task either independently (if instructed) or with their work partner. This is usually time restricted and instant feedback is provided where pupils will then self/peer assess in red



Finally, pupils will end the lesson with a plenary task which allows them to test their newly learned skills in novel, unfamiliar contexts. This helps further strengthen and develop knowledge, understanding and application.

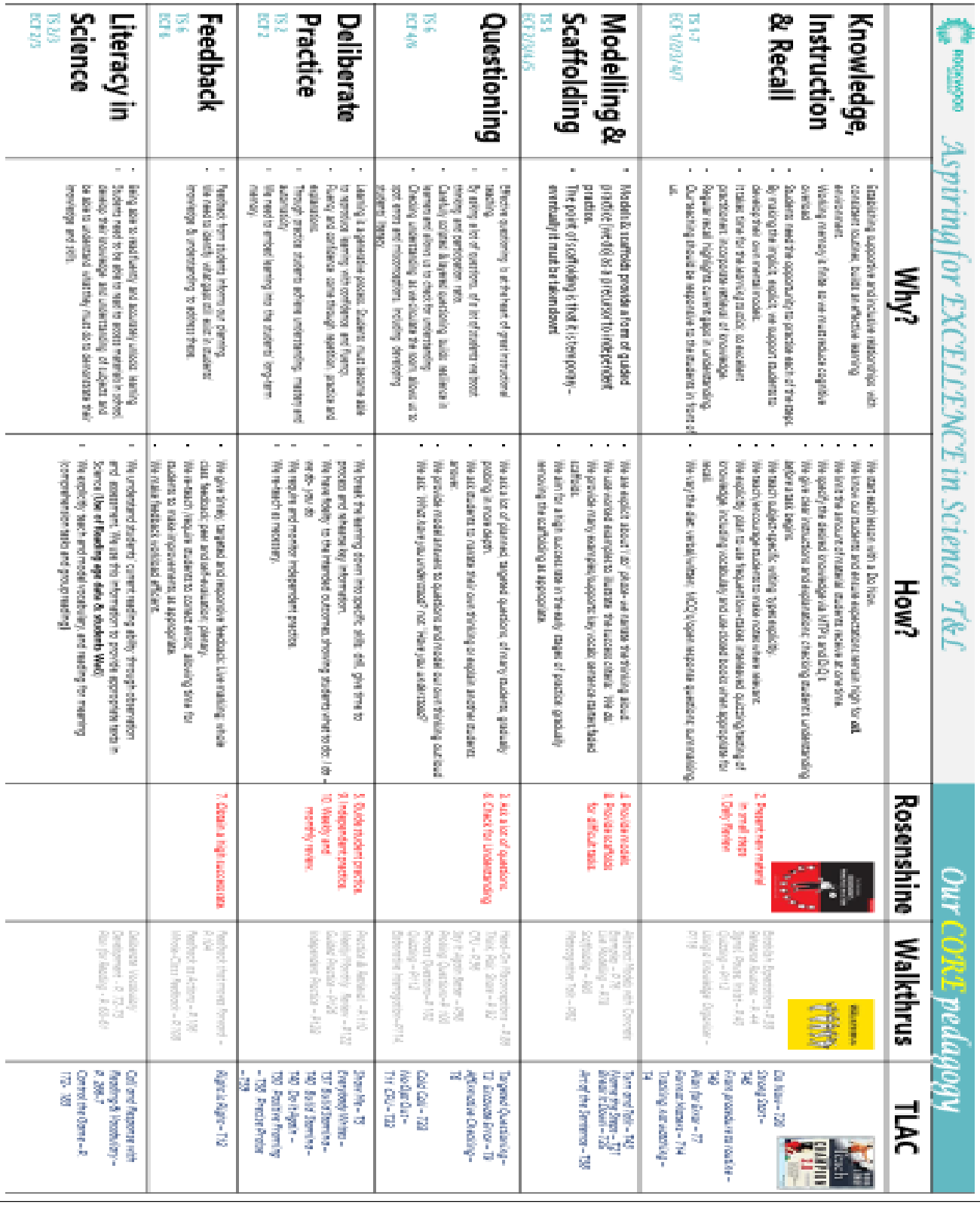


Note: All lesson should be planned on the Rockwood lesson planning template, utilising the same format & incorporating teaching model icons as appropriate.

Aspiring for Excellcence in Teaching & Learning:

The Science department is pedagogically driven, and consistently utilsies evidence infromaed practice to support teaching and learning. The strategies utilized are carefully selected based on the students needs and phase of the lesson.

As a department we have distilled down the “Why” and “How” for each core component of the lesson and identified the statesgies for each phase, the strategies have been drawn from the Walk-thru’s, TLAC & Rosenshin’s principles of instructions.



Homework policy

Homework is an integral part of the Science curriculum. It enhances learning, develops students' study skills and improves achievement. The department uses an online learning platform to issue homework to students [KayScience]. This additional study is essential to help students achieve or exceed their target level or grade in Science. Automatic software based AI marking of students' retrieval homework helps teachers make a judgement about a student's level of knowledge, understanding, skills, progress and attainment in Science. This granular level feedback is used to plan subsequent lessons and consolidation lessons.

A half termly overview of curriculum topics and potential homework tasks will be shared with teachers & parents via the school website. Teachers will use these topics to set retrieval based homework tasks on KayScience.

Homework tasks should:

- Have clear learning outcomes, which are understood by students.
- Be retrieval based.
- Be able to be completed within the timescale set and with accompanying resources readily available/easily accessible.

Types of Homework:

Homework should be varied in terms of tasks and be relevant, challenging and rewarding for students. Homework tasks will feature retrieval and consolidation questions. Students will complete all homework's through the online plaform. Students in Y7-Y11 will be issued with KayScience software logins to complete retrieval quizzes & targeted online revision activities.

The frequency of homework:

The following time allocations should be regarded as guidelines, the precise time spent on homework will depend upon the nature of the task and the student's level of ability. The quality of the homework is more important than the quantity of work produced. It is an expectation that Science homework should be set and completed at least once per week.

The time that students spend on homework will naturally vary depending upon both the nature of the task and the ability of the student, but the departmental guidelines are:
Y7 & Y8- 20 minutes per homework.
Y9- Y11- 30 minutes per homework.

Responsibilities:

The student will:

- listen to homework instructions in the Science lesson.
- write instructions for the HW task and the deadline date into their planner.
- attempt all parts of the homework to the best of their ability.
- whenever possible inform their Science teacher of any difficulties regarding homework, in advance of the deadline.
- ensure that homework is fully completed and handed in to meet the deadline.

The Science teacher will:

- allocate time to setting homework in lesson.
- set regular homework according to the Science homework schedule.
- provide the relevant stimulus materials for the Science homework.
- give full and comprehensive instructions to students, also upload instructions onto ClassCharts for parents & students.
- set deadlines for completed work and ensure that they are met.
- reward students appropriately, in line with whole school policy, when they produce high quality homework.
- sanction students appropriately, in line with whole school policy, for lack of homework, incomplete or poor quality homework.

Stretch and challenge in Science:

Stretch and challenge in Science teaching at Rockwood Academy refers to initiatives and strategies aimed at providing OUR students with opportunities to go beyond the standard curriculum, engage in deeper learning, and develop higher-order thinking skills within the context of science education. It involves creating an inclusive and stimulating learning environment that encourages students to explore scientific concepts, ask probing questions, and undertake challenging tasks.

Some of the facets of stretch and challenge in science teaching include:

1. **Differentiated Instruction:** Teachers can adopt differentiated instruction techniques to cater to the diverse learning needs and abilities of their students. This involves providing a range of tasks and activities that offer varying levels of challenge, allowing students to choose activities that align with their interests and abilities.

2. **Enrichment Activities:** Offering enrichment activities allows students to delve deeper into scientific topics and explore related areas of interest. This will include science clubs,arranging field trips to research institutions or science museums, inviting guest speakers, and providing access to online resources and educational platforms.

3. **Problem-Based Learning:** Incorporating problem-based learning approaches to challenge students to apply scientific knowledge and skills to solve real-world problems. Presenting students with authentic, open-ended problems stimulates critical thinking, encourages collaboration, and promotes the development of problem-solving skills.

4. **Research Projects:** Assigning research projects provides students with opportunities to conduct independent investigations, explore scientific phenomena, and develop their research and inquiry skills.

5. **Higher-Level Thinking Tasks:** Designing tasks that require higher-level thinking skills, such as analysis, synthesis, and evaluation, challenges students to go beyond memorization and apply their understanding in more complex ways. This may involve engaging students in debates, conducting literature reviews, analyzing scientific data, or designing and conducting experiments.

6. **STEM Challenges and Competitions**: We will seek opportunities to engage students in STEM challenges and competitions to promotes teamwork, creativity, and problem-solving skills. These activities aim to encourage students to think innovatively, stretch and apply their scientific knowledge.

7. **Continuous Assessment and Feedback:** Staff of G&T students will utilise the regular feedback policy and provide constructive feedback to direct pupils in producing quality work routinely. This allows teachers to identify individual strengths and weaknesses, provide guidance for improvement, and offer additional challenges or resources based on student needs.

Through carefully implementing stretch and challenge vernacular in science teaching, staff can inspire students' curiosity, foster a deeper understanding of scientific concepts, and cultivate critical thinking and problem-solving skills. This approach helps prepare students for future scientific pursuits, encourages their engagement in STEM fields, and promotes lifelong learning.

Monitoring and Evaluating this Policy:

The policy will be monitored through fortnightly developmental drop in's, lesson observations & through showcasing good departmental practice. Pupils' exercise books will be monitored by the SLT, TLR holders & the Head of Department during fortnightly QA visits and planned book scrutinies; with written and verbal feedback given to individual members of staff. Student feedback & views on embedding stretch and challenge in Science will be sought during the termly student voice panels.

Supporting SEN/D learners in Science:

What does adaptive teaching look like in Science?

"Schools have a responsibility to provide a broad and balanced curriculum for all pupils." National Curriculum, QCA, 2008

At Rockwood we firmly believe that this is more than just giving students 'access to the curriculum'. Our Science curriculum at Rockwood is not immovable, like some building, to which students with SEN and/or disabilities have to gain access. It is there to be changed, where necessary, to include all students. The departmental medium term plans [MTP's] can be modified and adapted to by teachers to ensure we are:

- Setting suitable learning challenges.
- Responding to students' diverse learning needs, and overcoming potential barriers to learning and assessment for particular individuals and groups of students.

Supporting learners with Special Educational Needs and Disabilities (SEND) in science learning requires an inclusive approach that addresses their specific needs and provides appropriate accommodations and support. The strategies that are utilised by the Science team to support SEND learners in science include:

1. **Responsive teaching:** Implement responsive teaching strategies in light of feedback from checking for understanding tasks and students performance within idnividua;/sequences of lessons. Provide a range of instructional materials, including visual aids, manipulatives, and multisensory resources, to cater to different learning preferences. Adapt activities and tasks to suit individual needs and provide additional support or extensions as necessary.

2. **Accessible Materials**: Ensure that science materials, such as textbooks, worksheets, and online resources, are accessible for learners with SEND. Provide materials in different formats, such as large print, or digital formats, to accommodate visual impairments or other specific needs. Use assistive technologies and tools, such as text-to-speech software or screen readers, to aid comprehension.

3. **Practical Hands-on Activities:** Engage learners in practical, hands-on science activities that promote experiential learning. Use real-life examples, demonstrations, and experiments to enhance understanding and provide concrete experiences. Provide necessary adaptations or additional support to ensure full participation and access to the learning experience.

4. **Use of Individualised Plans (IEPs):** Class teachers to utilise IEP's which have been collaboratively constructed with the learner, their parents/guardians, and support professionals to develop plans that address students specific needs and set achievable learning goals. The IEP's outline appropriate accommodations, modifications, and support strategies that will be used to promote student progress in science.

5. **Collaborative Learning and Peer Support:** Encourage collaborative learning experiences where SEND learners can work in pairs or small groups with their peers. This promotes social interaction, communication skills, and peer support. Assigning peer mentors or buddies can provide additional assistance and encouragement.

6. **Assistive Technologies:** Where appropriate class teachers will explore and implement assistive technologies that can support learners with SEND in science. This may include screen reading software, speech-to-text tools, interactive simulations, or adaptive equipment tailored to individual needs.

7. **Continuous Assessment and Feedback**: Regularly assess and provide constructive feedback to monitor progress and inform instruction. Use a variety of assessment methods, such as verbal responses, visual presentations, or alternative formats, to accommodate diverse communication and expression abilities. Provide feedback that is specific, supportive, and focuses on areas of improvement.

Narrowing the gap between SEN/D and non-SEN/D students in Science:

Following on from the EEF report on Special Educational Needs in mainstream schools, the Science team at Rockwood Academy are actively working to embed the recommendations into our teaching practice.

Recommendation:	How?
1. Create a positive and supportive environment for all pupils, without exception	- Use of active thresholds. - ClassCharts; Praise in public, reprimand in private. - Quality First planning utilsing the Rockwood Excellence teaching model. - Follow the departmental medium term plans, and adapting as required for learners.
2. Build an ongoing, holistic understanding of your pupils and their needs	- Use of IEP's & EHCP documentation and incorporating recommendations into T&L. - Making referals as required and liaising with the SEN/D team. - Utilising and deploying support strategically in lessons.
3. Ensure all pupils have access to high quality teaching	- Using adaptive teaching strategies and modified collaborative resources in light of student needs. - Ensure teaching, learning and assessment strategies provide appropriate stretch and support for students.
4. Complement high quality teaching with carefully selected small-group and one-to-one interventions	- Use of Classcharts data, SEN/D documentation and teacher judgement to establish optimal seating arrangements to aid live time intervention/checking for understanding.
5. Work effectively with teaching assistants	- Share copies of MTP and lesson sequence with the TA in advance of lessons. - TA to utilse revision guides and textbooks to provide additional pre/post teaching as required. - TA and teacher to live mark student work and provide immediate feedback/action steps.

Monitoring and Evaluating this Policy:

All of our students are considered as individual learners; though they may have similar areas of need, each student has unique strengths, challenges, and preferences, so it's crucial that our approach is student-centered.

Departmental leaders will regularly review the attainment and performance of SEN/D students, and where required, staff will adapt strategies based on the students progress and evolving needs to ensure an inclusive and meaningful science education experience.

References:

Content specific websites:
BBC Bitesize – **https://www.bbc.com/education**
www.edexcel.com/science
www.kerboodle.com
https://www.aqa.org.uk/subjects/science
http://www.bbc.co.uk/schools/gcsebitesize/science/edexcel/
http://www.bbc.co.uk/schools/gcsebitesize/science/aqa/
http://www.biologyinfo.co.uk/
http://www.kayscience.com

YouTube:
https://www.youtube.com/channel/UCBqvmal8AR4OIK2e0EfJwaA
https://www.youtube.com/channel/UCqbOeHaAUXw9ll7sBVG3_bw

Printed revision material:
KS4:
Pearson 9-1 Combined Science textbook
Pearson 9-1 Biology textbook
Pearson 9-1 Chemistry textbook
Pearson 9-1 Physics textbook
CGP GCSE Revision guide

KS3:
Activate 1 *[Oxford University Press]*
Activate 2 *[Oxford University Press]*
CGP KS3 Revision guide

Staffing:

Roles and responsibilities:

Ms S. Mahmood- Head of Department *[Responsible for Y11]*
Mr J. Hamula- Second in Department *[Responsible for Y9 & Y10]*
Mrs R. Begum- KS3 Co-ordinator *[Responsible for Y7 & Y8]*
Ms F. Bibi- Assistant Headteacher
Mrs. J. Wu- Head of Year 11
Mr W. Chung- Teacher of Science
Ms F. Kayani- Teacher of Science
Mrs S. Perveen- Head of Year 8
Mr H. Shah- Teacher of Science
Ms M. Sheikh- Teacher of Science
Vaccancy- Teacher of Science
Mrs S. Hussain- Science Technician

Staff name	Overview of role & responsibility
Miss S Mahmood [Head of Department]	**General oversight of all departmental policies & procedures.** - Delegation of roles & responsibilities of, 2iC, KS3 Co-ordinator, support staff, and all other staff who wish to progress and take on a responsibility for personal and professional development. Departmental meetings, agenda's & weekly bulletins - Compile agenda's in advance based on emerging priorities & whole school action points. - Incorporate a T&L slot in all meetings in line with content being delivered/areas identified during developmental drop in's/whole school priorities. - Design and send out weekly bulletin outlining all curriculum matters, upcoming events & deadlines. Curriculum - Lead on overall curriculum for KS3 & KS4. - Implement & embed effective literacy and reading practices within the team. - Design curriculum sequences which enable students to know more, remember more & do more. - Increase awareness of careers and application of Science in the wider world [Gatsby Benchmarks]. - Ensure departmental team area has high quality teaching material for each year group. - Lead on alignment to AQA Programme of Study; TLR holders to support with QA of all resources for AQA content. - Y10 & 11 Lead for curriculum plan, assessment & implementation. Data, reporting & intervention: - Design departmental data trackers for KS3 & KS4. - Oversee that the entry of AP data is in line with the whole school policy. - In case of staff absence ensure data is entered for groups. - QA validity of data entries via moderation & standardisation processes. - Provide all staff with QLA data for KS4 post mock assessments. - Provide all staff with information relating to Y11 intervention and targeted students. - Construct departmental QA spreadsheet & share with KS3 Co-ordinator & 2iC. - Share upcoming departmental & whole school data deadlines via weekly bulletin. Home learning: - Devise a home learning schedule per academic term & share with team. - Monitor teams setting of home learning for their groups. Teaching & learning: - Devise departmental CPD & programme to provide subject specific and pedagogical updates to support staff in delivery upcoming topics. - Where staff require support to improve, provide ongoing support & log through ongoing meeting record. - Share edu-articles/tweets & relevant pedagogical approaches via weekly bulletin. Health & safety in practical work: - Keep abreast of CLEAAP's guideline - Work with technical support staff to ensure all practical work conducted is of the highest standard. - Ensure all chemicals and lab materials are stored safely. - Complete audits of lab equipment & chemicals on a regular basis.
Dr. J. Hamula [2nd In Department]	Y9 Lead - Responsible for curriculum planning, assessment and implementation in Y9. - Ensure all Y9 assessments are printed and ready for staff to deliver. Send reminders to team about regarding assessment deadlines including input of data. - Auditing of data entries for all Y9 groups. - Auditing of curriculum coverage for all Y9 groups Cover work - Ensure appropriate cover work is set for absent colleagues in line with Academy expectations. Meetings & liasing with SLT LM - To lead on meetings in the absence of SMD. - To work alongside Science LM [FBI] in the absence of SMD, to ensure quality of T&L and departmental standards are upheld. Behaviour lead: - To provide support to new colleagues & trainee's in relation to behaviour management. Intervention: - Supports with design of KS4 lessons and departmental intervention programme.

Mrs. R. Begum KS3 Co-ordinator	Y7 & 8 Lead: - Responsible for curriculum planning, assessment and implementation in Y7 & 8. - Ensure all Y7 & 8 assessments are printed and ready for staff to deliver. Send reminders to team about regarding assessment deadlines including input of data. - Auditing of data entries for all Y7 & 8 groups. - Auditing of curriculum coverage for all Y7 & 8 groups. Subject mentor for trainees: - Provide subject specific mentoring for trainee students within the team. Liaise with external HE partners to monitor, support and guide trainees as required. SEND Lead: - Leads on sharing best practice for supporting SEND students within Science and accessing of curriculum. Intervention: Supports with design of KS4 lessons and departmental intervention programme.
Mr H. Shah Teacher of Science	Raising achievement of boy's lead: - Leads on sharing strategies to raise engagement and attainment of disengaged male pupils.
Miss F. Kayani Teacher of Science [ECT2]	Opportunities Lead KS3: - Identifies & organises logistics for enrichment events linked to KS3. - Runs KS3 Science club.
Mr W. Chung Teacher of Science	Physics Lead: - Design and deliver Physics CPD at departmental level based upon upcoming curriculum topics & staff developmental needs.
Mrs M. Sheikh Teacher of Science *[maternity cover]*	DIRT & Literacy lead: - Devising DIRT and AfL checks for KS3 curriculum. - Sharing literacy strategies at departmental level.
Vacancy position	-
Mrs J Wu Head of Y9	
Miss F. Bibi Assistant Headteacher	