



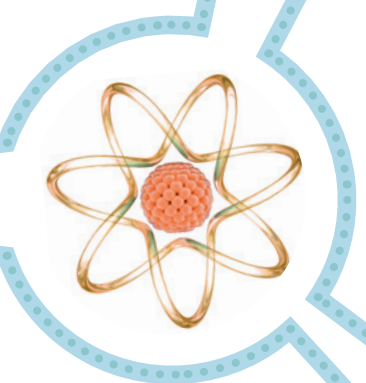
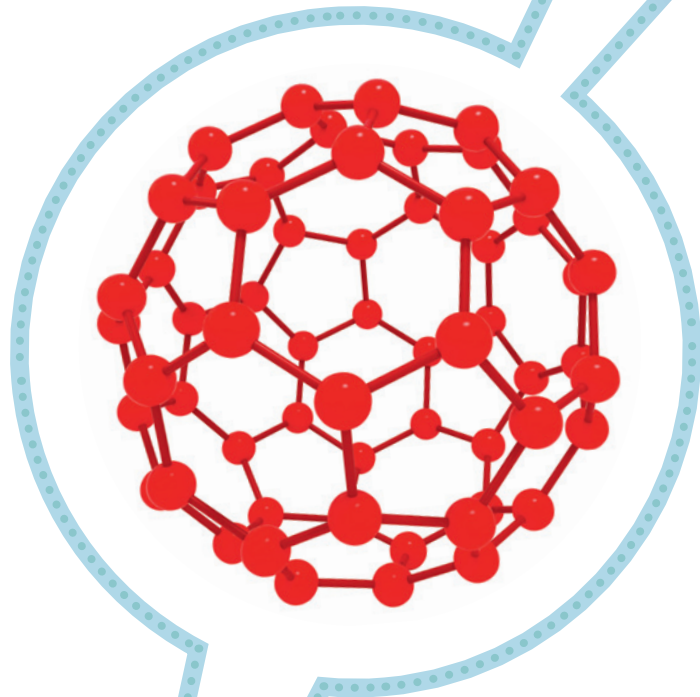
GCSE ADDITIONAL APPLIED SCIENCE J251

TEACHERS' HANDBOOK

THIS HANDBOOK IS DESIGNED TO ACCOMPANY THE OCR
GCSE ADDITIONAL APPLIED SCIENCE 2011 SPECIFICATION FOR
CENTRES TEACHING THE NEW ADDITIONAL APPLIED SCIENCE.

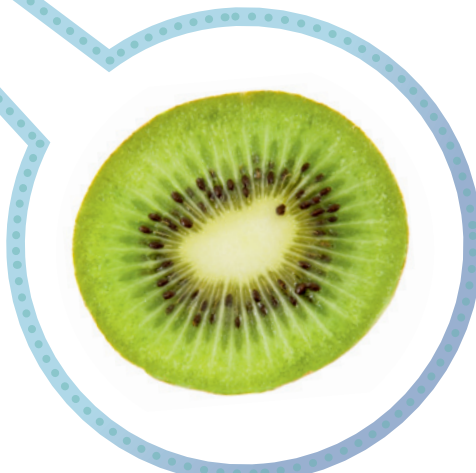
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This handbook is designed to accompany the OCR GCSE Additional Applied Science 2011 specifications for centres teaching the new Additional Applied Science.

We may update this document from time to time, to reflect teachers' needs. Please check our GCSE Sciences support website (www.gcse-science.com) at the start of each academic year to ensure that you are using the latest version.



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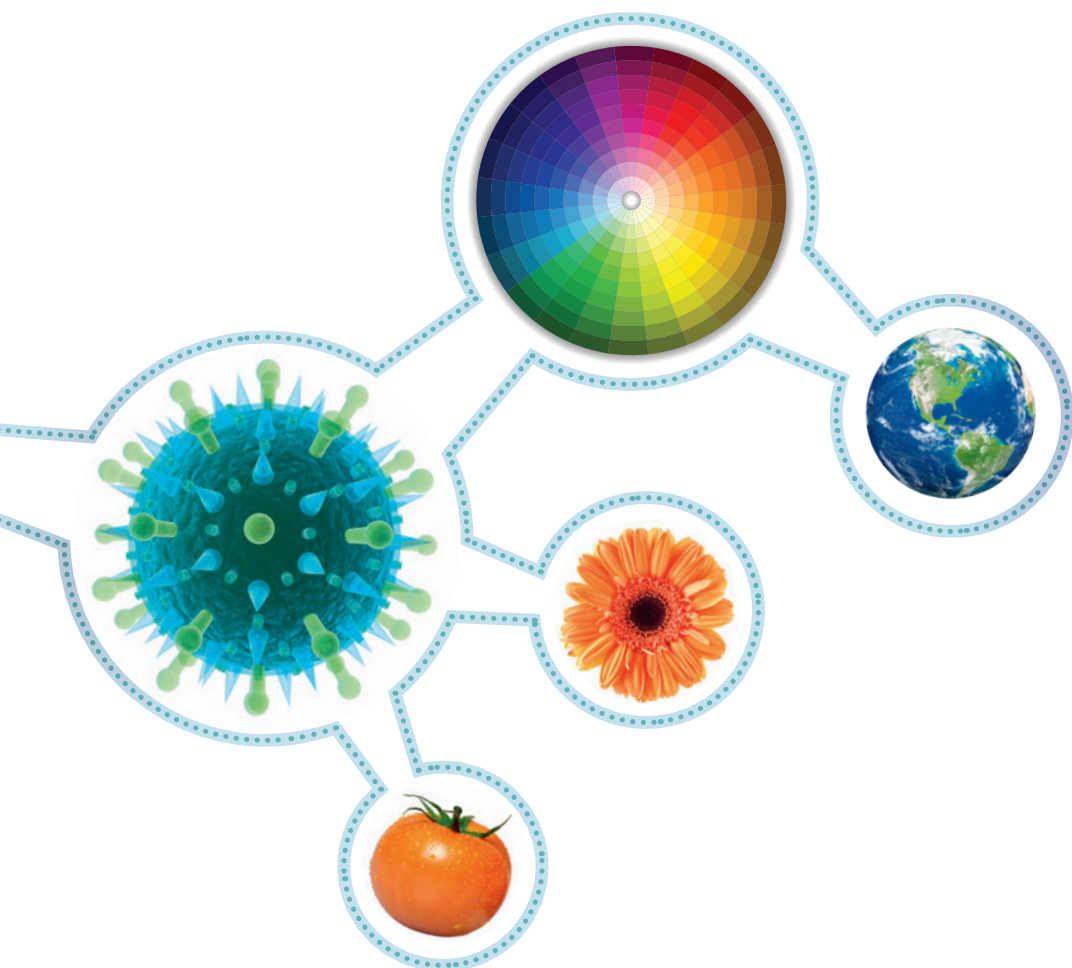
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GCSE ADDITIONAL APPLIED SCIENCE: REFRESHED FOR 2011

OCR is offering new GCSE Science specifications for first teaching in September 2011.

We've taken this opportunity to improve the quality of our GCSEs for teachers and candidates alike.

We want to make the introduction of these new GCSEs as easy for you to manage as possible.

The main changes are:

- the course content has been brought up-to-date to maintain its relevance to candidates, with a focus on developing candidates' personal, learning and thinking skills
- external assessment question papers provide more opportunities for candidates to demonstrate their skills in extended writing, Mathematics and evaluation of evidence
- Controlled Assessment is introduced (to replace coursework).

A MOVE TO LINEAR (100% TERMINAL) ASSESSMENT?

This handbook has been written to accompany the specifications accredited by Ofqual, the examinations regulator, in Spring 2011 for first teaching in September 2011. As such it reflects the fact that the specification was designed in a unitised format, allowing flexibility for units to be assessed either throughout the course or all together at the end.

We now have confirmation that GCSEs will be Linear (100% terminal) starting from June 2014. The last certification for the modular GCSE will be June 2013. There will be no re-sits for Science GCSEs.

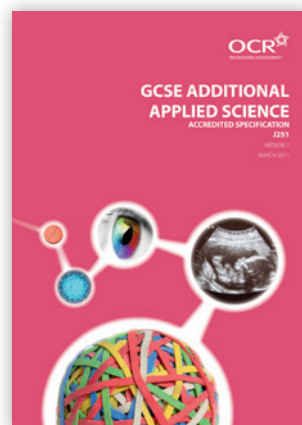
THE PURPOSE OF THIS HANDBOOK

This handbook accompanies the new OCR GCSE Additional Applied Science specification for teaching from September 2011.

It is important to understand that this handbook plays a secondary role to the specification. The GCSE Additional Applied Science specification is the document upon which assessment is based; it specifies the content to be studied and the skills that candidates will need to develop. At all times, therefore, the Teachers' Handbook should be read in conjunction with the specification.

This Teachers' Handbook aims to:

- summarise what has changed, for the benefit of centres who taught the legacy (2006) Additional Applied Science specification
- discuss the format of the external assessment written papers
- highlight useful resources for Additional Applied Science teachers.



We may update this handbook from time to time, to reflect teachers' needs. Please check the our GCSE Sciences support website (www.gcse-science.com) at the start of each academic year to ensure that you are using the latest version.

OVERVIEW OF CHANGES

The 2011 specification for Additional Applied Science is the revised and updated version of the 2006 specification.

GCSE Additional Applied Science is no longer considered to be part of the Twenty First Century Science suite. This change reflects the fact that it can be taught equally well alongside either Twenty First Century Science GCSE Science A or Gateway Science GCSE Science B.

GCSE Additional Applied Science will continue to be supported by the University of York Science Education Group and Oxford University Press.

The 2011 specification has been developed with the principle of minimum change wherever possible. However, where changes have been made this is due to:

- implementation of recommendations of the Ofqual March 2009 report '*The new GCSE Science examinations: findings from the monitoring of the new GCSE Science specifications 2007 to 2008*'
- the QCDA fundamental review of the GCSE criteria and the bringing of the Sciences' criteria into line with other GCSEs
- the issue by QCDA of new subject criteria for GCSE Additional Applied Science
- the need to bring the 2006 specification content up-to-date, in order to maintain its relevance to candidates in the second decade of the 21st century, and to address issues raised by teachers about particular areas of the specification and the clarity of the requirements.

Updating the specification has also provided us with the opportunity to:

- increase the provision of practical opportunities
- ensure continuity from KS3 to KS4, and from KS4 to KS5.

THE NEW GCSE SCIENCES SUBJECT CRITERIA

The new subject criteria for GCSE Additional Applied Science were published by QCDA in 2009. They prescribe the content, skills, assessment objectives and assessment weightings for the new Science GCSEs to be taught from September 2011.

The specification comprises prescribed and additional content as follows:

- For GCSE Additional Applied Science 100% of the content is prescribed by the subject criteria.

WHAT HAS STAYED THE SAME?

Existing teachers of Additional Applied Science will find that the new specification is very similar to the 2006 specification it replaces.

- The content of the new specification includes some of the popular parts of the old specification, life care, agriculture and food, scientific detection, harnessing chemicals and materials and performance
- External assessment question papers are still offered in Foundation and Higher tiers, and retain a mixture of objective and free-response questions.
- GCSE Additional Applied Science retains the Standard Procedures, Suitability Test and Work-related Report.
- GCSE Additional Applied Science can be taken as the second Science to any GCSE Science qualification or as a stand alone qualification although it still builds on the knowledge candidates have learnt in GCSE Science.

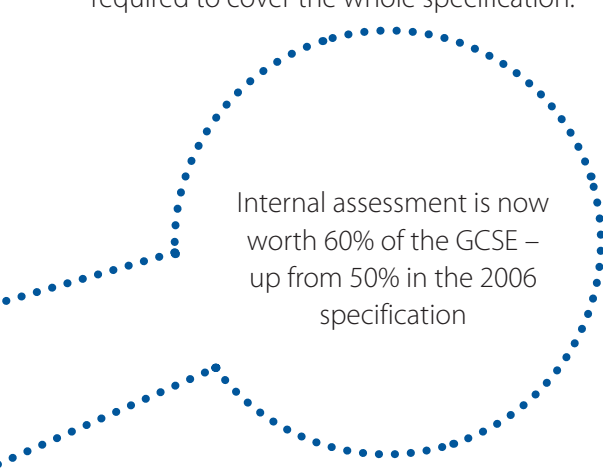
And fundamentally, the ethos of the Additional Applied Science and its modern and relevant approach to Science teaching and learning remain unchanged.

WHAT HAS CHANGED?

Assessment units and weightings

GCSE Additional Applied Science now consist of three units, comprising two external assessment (written paper) units and one internal assessment (Controlled Assessment) unit.

There is no choice of Topics anymore. Candidates are required to cover the whole specification.



Internal assessment is now worth 60% of the GCSE – up from 50% in the 2006 specification

- include more extended writing questions (worth 6 marks)
- include more assessment of Mathematics skills, and ensure that Mathematical work is developed towards a scientific end point
- provide a greater variety of question types
- provide less 'scaffolding', particularly in Higher tier papers
- include more assessment of Assessment Objectives 2 and 3 (AO2 and AO3)
- assess plenty of Higher tier material in the Higher tier papers
- include 'stretch and challenge' in the Foundation tier papers, by assessing material at the C-grade level that is not found on the Higher tier paper (does not overlap).

In addition, Quality of Written Communication (QWC) will now be assessed in **all** question papers within Additional Applied Science.

EXTERNAL ASSESSMENT – INCREASED 'CHALLENGE'

All question papers in Additional Applied Science are now:

- worth 20% of the GCSE
- marked out of a total of 50 marks
- 1 hour in duration.

Ofqual has instructed all assessment organisations to increase the 'challenge' of external assessment papers in the GCSE Sciences. But this does not mean simply increasing the difficulty of the questions in the new specification papers; rather, the balance of different question types within the papers has been changed, and candidates will be provided with greater opportunity to demonstrate what they know and can do.

Question papers for the 2011 specification in the Additional Applied Science suite will:

- include fewer objective questions
- include fewer 1-mark questions
- include more continuous writing questions (worth 2-5 marks)

CONTROLLED ASSESSMENT

Coursework has been replaced by Controlled Assessment, a form of internal assessment that adheres to the new Controlled Assessment regulations.

However, we have retained the familiar feel of Additional Applied Science internal assessment tasks: the Standard Procedures, Suitability Test and Work-related Report have been adapted to fit the Controlled Assessment regulations and will be based upon tasks issued by OCR, which will be simpler to administer and mark.

For full details, see chapter 5 of the specification and also the *Guide to Controlled Assessment for GCSE Additional Applied Science* available to download for free from our specification web pages at www.ocr.org.uk/qualifications/type/gcse_2011/science/add_app/index.html

SUMMARY OF SPECIFICATION CONTENT CHANGES

Presented here is an overview of the changes in content and emphasis within each module. Note, however, that prior to teaching it is essential that you work through the specification closely to check the fine detail of the changes.

Unit 191 Science in Society

| | |
|---|--|
| A1 Sport and Fitness (SF) | This contains content from the old Life Care module. |
| A2 Health Care (HC) | This again is based on the old Life Care module limited to emergency care, antenatal and post-natal care. |
| A3 Monitoring and Protecting the Environment (MPE) | This contains content from Scientific Detection; collecting evidence, measurement and colour analysis of soil and water |
| A4 Scientists Protecting the Public (SPP) | This again is based on the old Scientific Detection; colour analysis – colourimeters, imaging, Chromatography and electrophoresis. |

Unit 192 Science of Materials and Production

| | |
|---|--|
| B1 Sports Equipment (SE) | This contains content from the old Materials and Performance module |
| B2 Stage and Screen (SS) | This again contains content from the old Materials and Performance module |
| B3 Agriculture, Biotechnology and Food (ABF) | This contains some elements from the old Agriculture and food module but with more emphases on milk, wheat and biotechnology |
| B4 Making Chemical Products (MCP) | This contains elements from the old Harnessing Chemicals but with a more applied emphasis. |

APPLIED ALTERNATIVES TO GCSE ADDITIONAL APPLIED SCIENCE A



OCR offers another applied Science GCSE, which can be taught with GCSE Science A as an alternative to (or in addition to) GCSE Additional Applied Science.

This is:

- GCSE Environmental and Land-Based Science (ELBS)

For more information go to: www.ocr.org.uk/qualifications/type/gcse_2011/science/elbs/index.html

TRANSITION

Information in this chapter is correct at the time of writing (November 2012), but dates may be subject to change. Check www.gcse-science.com for the latest announcements.

FINAL ASSESSMENT AND CERTIFICATION FOR THE 2006 SPECIFICATION

The final assessment opportunity will be June 2012 for the 2006 specifications in:

- GCSE Science A
- GCSE Additional Science A
- GCSE Biology A
- GCSE Chemistry A
- GCSE Physics A
- GCSE Additional Applied Science A
- GCSE Environmental and Land-Based Science

A re-sit opportunity of examination papers only (not coursework) will be provided in January 2013.

The final opportunity to certificate for any of the 2006 specifications will follow the re-sit session in 2013.

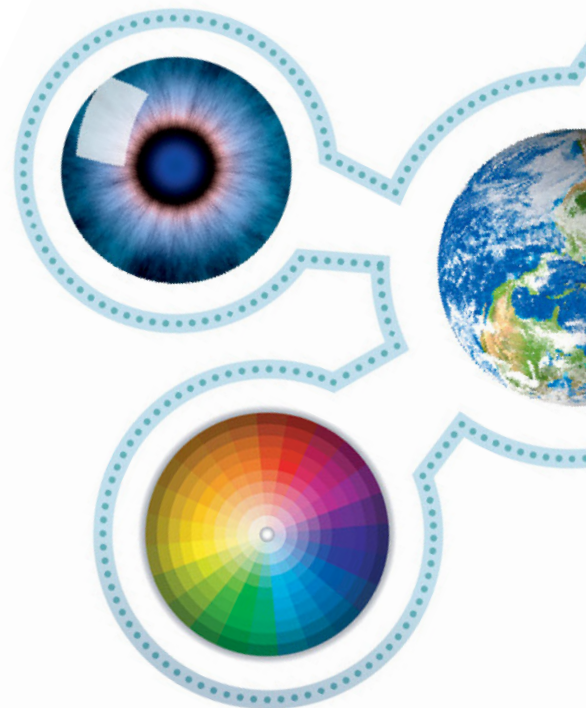
TEACHING TRANSITION STRATEGY

In **September 2011**:

- Candidates commencing a **two-year** or **three-year** programme must follow the 2011 specification.

In **September 2012**:

- All candidates must follow the 2011 specification.



FIRST ASSESSMENT AND CERTIFICATION FOR THE 2011 SPECIFICATION

First assessment and certification dates for the Additional Applied Science 2011 specification is as follows:

| Specification name | Unit | First assessment* | First certification |
|--|---|-------------------|---------------------|
| GCSE Additional Applied Science (J251) | Unit A191 (Science in Society) | June 2012 | June 2013 |
| | Unit A192 (Science of Materials and Production) | January 2013 | |
| | Unit A193 (Controlled Assessment) | June 2013 | |

* The external assessment (question paper) units of each specification will be assessed in the June series starting from the series given in the 'First assessment' column of the table. Controlled Assessment units can be submitted in each June series starting from the series given in the table.

TEACHING AND ASSESSMENT

A consistent approach is maintained across the Additional Applied Science suite of GCSEs.

USING THE SPECIFICATION

In each specification within the suite, chapter 3 sets out the content that will be assessed.

Statements in **bold** in the specifications will only be assessed in **Higher tier** papers.

Chapter 3 in each specification is divided into two units, each unit corresponding to one of the two question papers that will be used for external assessment of the content in the specification.

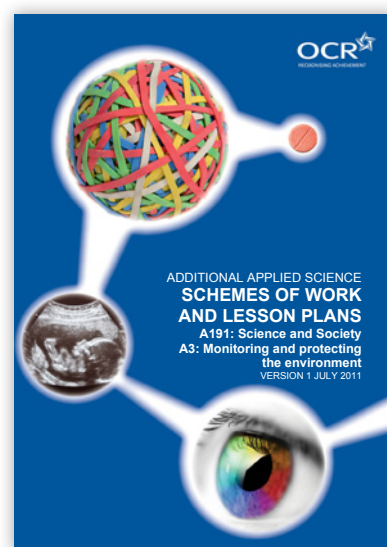
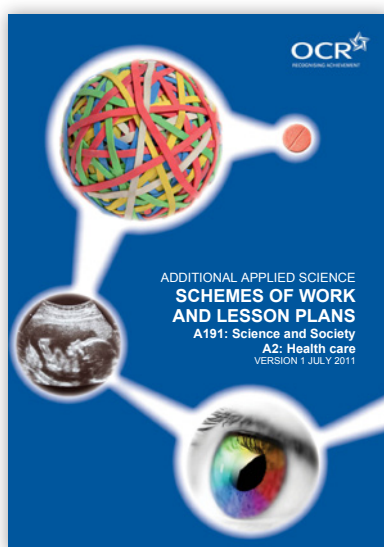
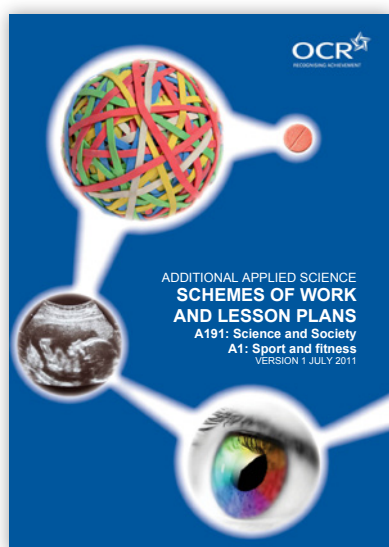
Each unit is divided into one or more topics, comprising content focussed on a particular theme or area of Science.

HELP WITH SCHEMES OF WORK AND LESSON PLANS

Each module has been designed to tell a logical story, and thus provides an outline scheme of work that can be used to develop lesson plans. However, it is not essential to teach the modules in ascending numerical order; with some care, you can change the order to suit your centre's scheme of work and teaching arrangements.

Sample schemes of work and lesson plans are available to download for free from our specification web pages at: www.ocr.org.uk/qualifications/type/gcse_2011/science/add_app/index.html

The University of York Science Education Group, the Nuffield Foundation and Oxford University Press also offer extensive support in this area – see the 'Additional resources' chapter of this handbook for details.



FREQUENTLY ASKED QUESTIONS

Q: What happens if a certification entry is not made in the final series?

A: Certification entries must be made. Without a certification entry, the candidate will not receive their subject award. However, you have until the post-results series deadline to make a late certification entry.

THE EXTERNAL ASSESSMENT QUESTION PAPERS

Anatomy of a question paper

Each question paper for in Additional Applied Science is marked out of a total of 50 marks.

There are no optional questions; all questions on each paper must be attempted.

The marks in each paper will be allocated approximately as follows:

| Assessment Objective | proportion of each paper |
|----------------------|--------------------------|
| AO1 | approx. 45% |
| AO2 | approx. 50% |
| AO3 | approx. 5% |

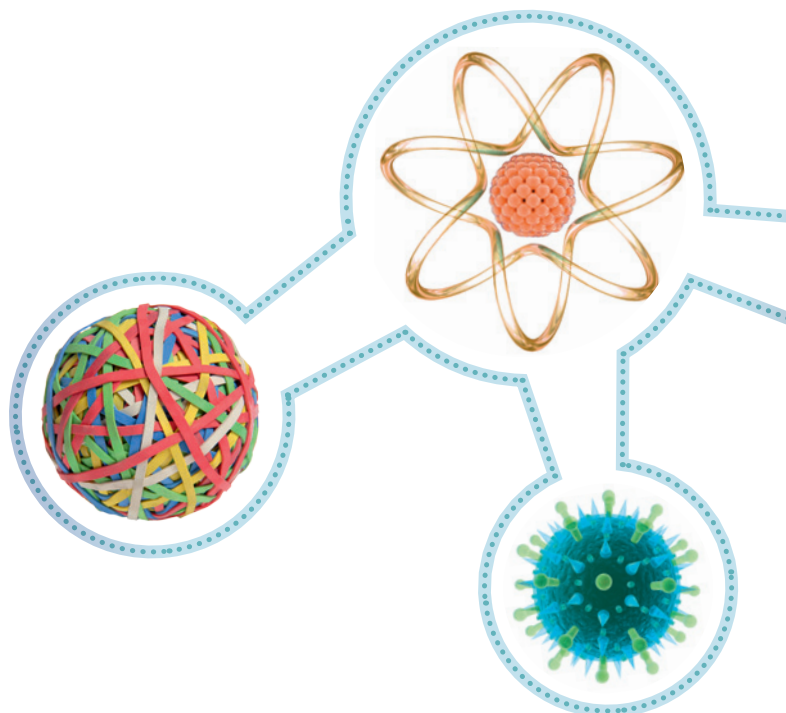
| type of question | proportion of each paper |
|--|---|
| objective-style questions | approx. 20 - 30% depending on the tier |
| 1-mark questions | |
| continuous writing questions (2-5 marks) | approx. 24 - 44% depending on the tier |
| extended writing questions (6 marks) | 3 x 6-mark questions (36%) |

| skill being assessed | proportion of each paper |
|----------------------------------|--------------------------|
| Mathematics skills | 20% |
| quality of written communication | 5% |

Tick-box questions will **not** always indicate how many ticks are required.

Candidates should **not** assume that the number of marks available indicates the number of ticks required.

Candidates must evaluate each of the possible answers on its own merit, and then tick each one they think is correct.



Assessment Objectives (AOs)

Three Assessment Objectives (AOs), defined by the examinations regulators, require candidates to be able to demonstrate their abilities as follows:

| | |
|------------|---|
| AO1 | Recall, select and communicate knowledge and understanding of Science. |
| AO2 | Apply skills, knowledge and understanding of Science in practical and other contexts. |
| AO3 | Analyse and evaluate evidence, make reasoned judgements and draw conclusions based on evidence. |

AO1 requires only direct **recall** and communication of knowledge gained by studying the specification.

AO2 requires the **application** of skills learnt from the specification to an **unfamiliar** context. The need for an unfamiliar context in which candidates can apply their skills and knowledge means that the question may appear, at first glance, to be off-specification. However, the question stem will furnish the candidate with all the additional information they need to be able to answer the question when they apply what they have learnt in other contexts to the situation described in the question.

Some questions will ask the candidate to explain whether they agree or disagree with a statement or conclusion.

No marks will be given for saying "yes/no" or "agree/disagree"; rather, the marks will be awarded for **explaining** or **justifying** this judgement.

To answer certain questions, candidates will need to **apply** what they have learnt to an **unfamiliar** situation.

If a candidate thinks the context described in a question looks unfamiliar, they should:

- think about how it is similar to something they have learnt
- look for clues in the question that suggest how they can relate the situation to what they know
- and, most of all, **don't panic!**

Note that the command word "describe" does not necessarily mean that an AO1 answer is required, and that the command word "explain" does not necessarily require an AO2 answer. For example, if a specification statement requires candidates to explain something, then any 'explain' question on this learning objective will require an AO1-style (recall) answer.

AO3 requires the candidate to:

- look at evidence or data
- do more than simply describe evidence
- do more than simply process data
- synthesise their own judgement or conclusion.

An AO3 question will go beyond just "processing for processing's sake", and will require the candidate to work to an end point that relates to the scientific context given in the question via some sort of conclusion or judgement.

OBJECTIVE-STYLE QUESTIONS

Objective-style questions are those that require candidates to choose from a selection of possible answers.

Styles of objective question used in Additional Applied Science question papers include:

- ticking items in a list to identify correct answers, or to distinguish true from false answers
- drawing a ring around correct answers
- selecting a word or phrase to complete a sentence
- ordering statements into the correct sequence
- selecting correct statements from a selection of 'talking heads' speech bubbles
- joining items by drawings lines from one list to another.

- The *depth* of answer required (i.e. the amount of detail needed) can be judged from the number of answer lines provided and the number of marks allocated to the question.

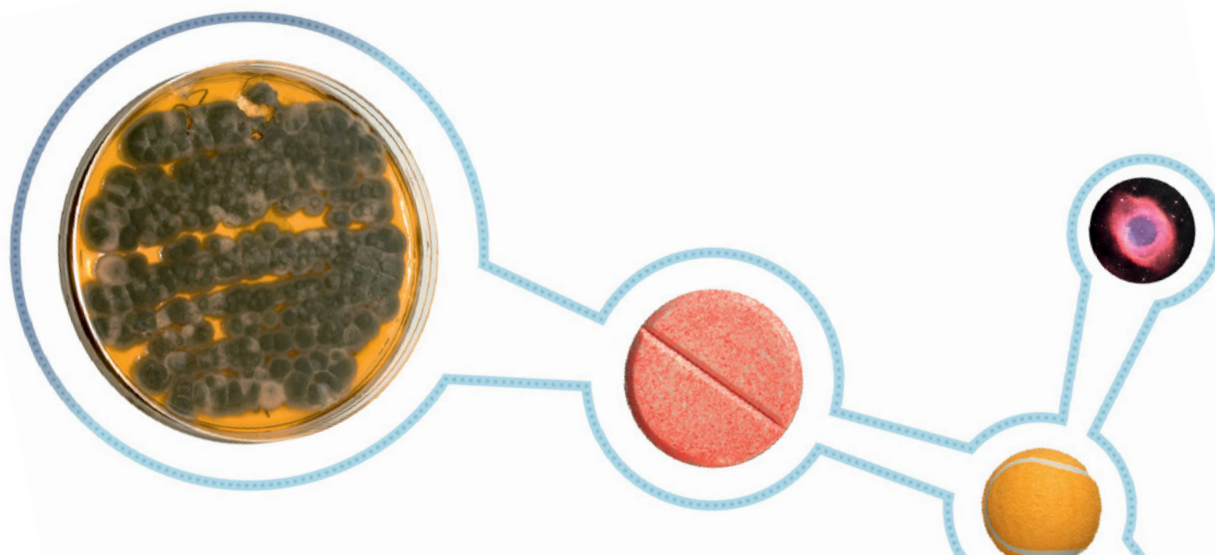
Guidance on command words is given at the end of this section.

The information given in the question stem will help candidates to decide how much of the topic they need to cover in their answer, but the examiner will have been careful not to provide too much 'scaffolding'.

CONTINUOUS WRITING QUESTIONS

Questions worth 2-5 marks in which candidates must synthesise their own answer (rather than choose from a selection of possible answers) are classed as 'continuous writing' questions.

- The *breadth* of answer required (i.e. how much of the topic to cover in the answer) will be indicated by the question stem, particularly by the command word used and the amount of information given in the stem.



For example, consider the following construction:

2 Explain why a certain thing works the way it does.

In your answer you should write about

- This.
- And this.
- And also this.

.....

.....

..... [3]

This construction tells the candidate what to include in their answer, and will not be used in questions targeted at grade D or above. It may be seen very occasionally on questions targeted at grades G, F or E.

However, now consider the following construction:

(c) Here are some things Gertrude could do when she repeats her experiment.

- This.
- And this.
- And also this.

Explain which of these would increase the confidence in her conclusion.

.....

.....

..... [3]

This construction may be used in any question, because the bullet points are information to be analysed; they are not telling the candidate what to include in their answer.

Bullets used in this way increase accessibility of the question when there is a lot of information for the candidate to read, which may be the case in questions assessing AO2 and AO3 skills.

In continuous writing questions, the examiner will be looking to see that the candidate has presented a **cohesive argument** in their answer, rather than simply writing several unlinked points.

Conjunctive words and phrases such as "because", "so that" and "however" used between statements will help.

Extended writing questions and quality of written communication

Each question paper in Additional Applied Science will contain **three** extended writing questions.

Each of these questions will:

- be exactly 6 marks
- assess the candidate's Quality of Written Communication (QWC)
- be marked using a 'levels of response' mark scheme.

A pencil icon and a rubric will inform candidates that their quality of written communication will be assessed in their answer to this type of question.

For example, the following question has been reproduced from the accredited Specimen Assessment Material for GCSE Additional Applied Science Unit A191 (Higher tier):

Sanjay takes part in a race through forests in Africa, where it is hot and humid.

(c) Use your knowledge about temperature control to explain **how** Sanjay's body tries to keep his body temperature constant.

The quality of written communication will be assessed.

.....

.....

.....

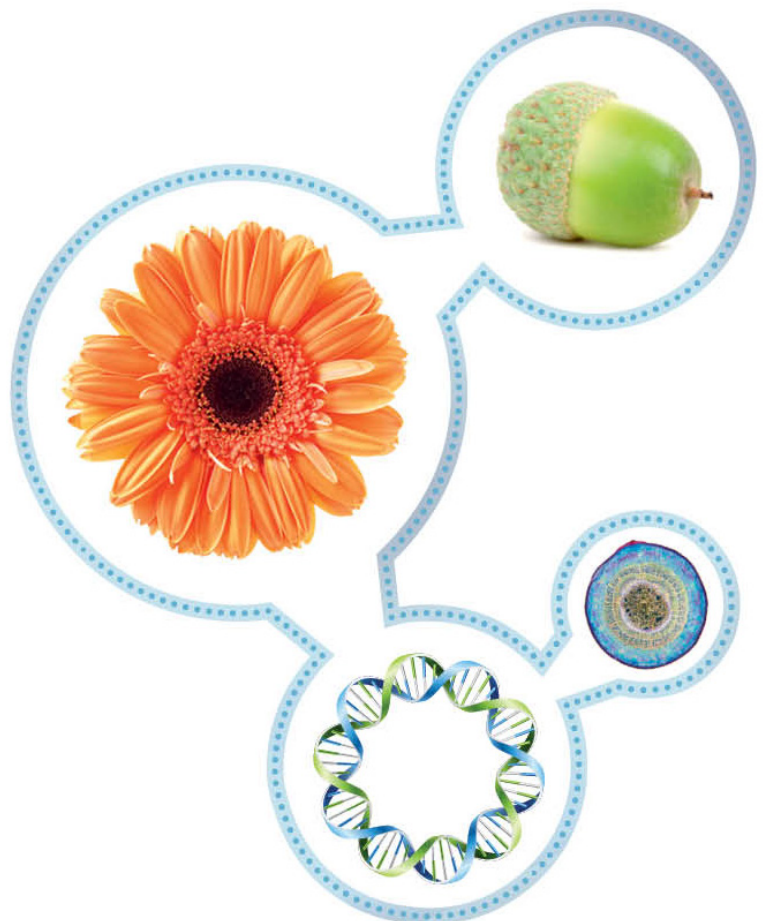
.....

.....

.....

.....

[6]



QWC skills that may be assessed in extended writing questions include:

- spelling, punctuation and grammar
- appropriate use of correct scientific terms
- developing a structured, persuasive argument
- selecting and using evidence to support an argument
- considering different sides of a debate in a balanced way
- logical sequencing.

All six-mark extended writing questions will be marked using a 'levels of response' mark scheme. The assessment of QWC is embedded into the levels described in the mark scheme – it is not a standalone mark, hence the total number of marks available for the question is expressed as **[6]**, rather than as **[5+1]**.

The levels of response mark scheme for a six-mark extended writing question will always be divided into columns.

- The column entitled "Additional guidance" gives a list of relevant points that a candidate might be expected to make if they are performing at Level 3. The "relevant points" are not to be taken as marking points, but as a summary of points that will allow examiners to judge how well the candidate has grasped the relevant Science and skills of the topic area.

For the example question given on the previous page, the "Additional guidance" column contains the following list of relevant points:

Relevant points include:

- Rise in temperature will stimulate receptors in Sanjay's body
- This causes the capillaries near his skin to dilate
- So increasing the blood flow through them
- It will also cause an increase in sweating
- But this is not effective as the forest is humid so the sweat will not evaporate
- Therefore heat loss will be due to radiation from the skin
- Loss of water by conduction
- Because sweat will drip off him
- Loss of water by convection
- Because the speed of the bike will create a draught so this will keep him cool.

- The column entitled "Expected answers" contains descriptors for four levels, numbered from level 3 down to level 0.

The first sentence or two of each level descriptor describes the indicative scientific content of answers in this level; the following sentences describe the indicative quality of written communication.

The expected quality of written communication is different in the three levels, and it will always be considered at the same time as looking at the scientific information in the answer.

When marking, the examiner will first decide which of these levels best describes a candidate's answer. The candidate will then be awarded the higher or lower mark within the level depending on the quality of the Science and the quality of the written communication in their answer.

For the example question given on the previous page, the "Expected answers" column contains the following level descriptors:

LEVEL 3

Candidates get facts and processes correct leading to the correct changes in body temperature. Includes both cooling and heating.

All information in answer is relevant, clear, organised and presented in a structured and coherent format suitable for purpose. Specialist terms are used appropriately. Quality of written communication does not impede communication of the Science at this level. (5 – 6 marks)

LEVEL 2

Includes most of the above. May include some errors or omissions i.e. good account of 1 method of temperature control or partial account of both. For the most part the information is relevant and presented in a structured and coherent format suitable for purpose. Specialist terms are used for the most part appropriately. Quality of written communication partly impedes communication of the Science at this level. (3 – 4 marks)

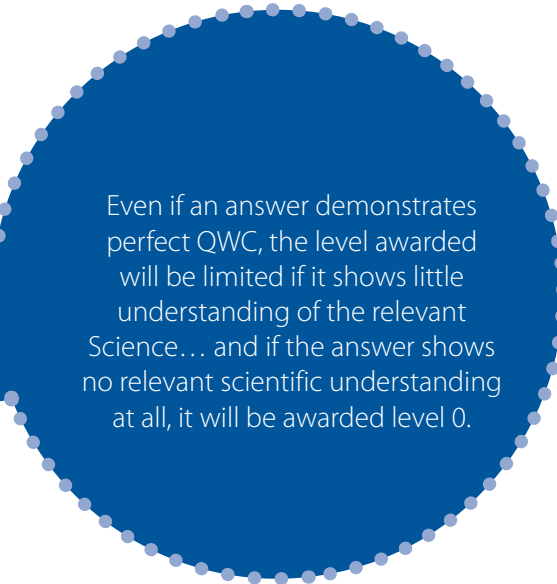
LEVEL 1

Refers to blood flow, sweating and shivering but no explanation given.

Answer describes correctly the change for one or two gases and gives a correct reason for one of them. There may be limited use of specialist terms. Quality of written communication impedes communication of the Science at this level. (1 – 2 marks)

LEVEL 0

Insufficient or irrelevant Science. Answer not worthy of credit.



Even if an answer demonstrates perfect QWC, the level awarded will be limited if it shows little understanding of the relevant Science... and if the answer shows no relevant scientific understanding at all, it will be awarded level 0.

MATHEMATICS SKILLS

“Mathematics skills” does not just mean doing calculations – it includes all of the quantitative, processing, graphical and interrogative skills listed in the subject criteria for GCSE Sciences. These Mathematics skills are listed in **Appendix B** in the specification for Additional Applied Science.

Within question papers, candidates will need to be able to demonstrate competence in all of the mathematical skills listed in Appendix B of the specification. These skills will be assessed within a scientific context, and will often require candidates to develop their mathematical answers towards a scientific conclusion or judgement.

It may be helpful to understand how certain Mathematics skills can be classified as AO1, AO2 or AO3-type skills. The following may be used as a guide:

AO1 – Recall, select and communicate knowledge and understanding

- recall of a unit
- selection of an appropriate formula

AO2 – Apply skills, knowledge and understanding in practical and other contexts

- calculating a value from data
- substitution of numbers into a formula and calculating the answer
- reading or calculating a number from a graph
- description of trends in data or the shape of a graph (i.e. what is happening and when?)
- explanation of trends in data or the shape of a graph (i.e. why is it happening?)
- comparing the data to other data sets
- commenting on how repeatable or reproducible the data are

AO3 – Analyse and evaluate evidence, make reasoned judgements and draw conclusions based on evidence

- analysing data or a graph and making a judgement or giving a conclusion, based upon evidence in the data or graph

(Note: reaching a conclusion involves more than just picking out numbers – there should be synthesis of an idea that is based upon the data but is not simply picked out from them)

- commenting on the implication(s) of the data or experiment (including it could be useful)
- evaluation – i.e. critique of the method used, commenting on how much confidence can be placed in the conclusion, etc.

COMMAND WORDS

It is important that candidates are able to recognise the command words used in question papers, and understand what kind of answer is required by each command word.

The following list sets out some of the commonly used command words and provides guidance on the meanings of the words. The list is not intended to be exhaustive

or exclusive, but is intended as a guide to the most commonly used command words.

The exact requirements of a command word must always be interpreted within the context of the question in which it appears.

| | | | |
|------------------|--|-------------------|---|
| Calculate | Work out a numerical answer. The question will indicate whether or not working must be shown. Appropriate units may be given on the answer line, but if the units are not given they should be included in the answer. (Compare with 'Estimate' and 'Predict') | Justify | Provide evidence or explanation that supports an answer, to explain why the answer was given. |
| Compare | Identify similarities and differences. | Label | Add names or other identifying words to a diagram (using a straight line from the word to the appropriate feature on the diagram). |
| Complete | Add words, numbers, labels or plots to complete a sentence, table, diagram or graph. | Measure | Determine a numeric value (a quantity for a variable) using a suitable measuring instrument. |
| Describe | Set out the facts or characteristics. The answer should address what happens, and when and/or where it happens. (Compare with 'Explain') | Name | Provide appropriate word(s) or term(s). |
| Discuss | Give a detailed account that addresses a range of ideas and arguments. It may be necessary to consider opposing sides of a debate, and/or to include ideas, opinions and facts. | Outline | Set out only the key or essential facts, steps or characteristics. |
| Draw | Produce a diagram with sufficient detail and labels to illustrate the answer. (Compare with 'Sketch') | Plot | Translate data into a suitable graph or chart, with labelled axes. |
| Estimate | Suggest an approximate value, without necessarily performing an accurate calculation or measurement. Appropriate units may be given on the answer line, but if the units are not given they should be included in the answer. (Compare with 'Calculate' and 'Predict') | Predict | Write down a possible outcome or value, based on given or calculated information or data. (Compare with 'Calculate' and 'Estimate') |
| Explain | Set out reasons and/or mechanisms to address why and/or how something happens. (Compare with 'Describe') | Show | Write down details, steps or calculations to prove a fact or answer. |
| Evaluate | Comment on given facts, data or information, and give a judgement, conclusion or opinion if appropriate. | Sketch | Produce a simple, freehand drawing to illustrate the general point being conveyed. Detail is not required. In the context of a graph, the general shape of the curve would be sufficient without plotting precise points. (Compare with 'Draw') |
| | | Suggest | Apply scientific knowledge and understanding from the specification to a novel situation or context. |
| | | Write down | Provide a concise answer with no supporting argument. |

"Student speak" definitions of common command words have been provided in **Appendix B** of this handbook, which can be used as a classroom handout.

ADDITIONAL RESOURCES

Page iii of the specification gives details of support materials, training and services provided by OCR to support you in teaching the Additional Applied Science 2011 specification.

This chapter highlights some of these, and also lists other resources you may find useful.

UYSEG and the Nuffield Foundation

Additional Applied Science was developed by the University of York Science Education Group (UYSEG), the Nuffield Foundation, Oxford University Press and OCR.

Extensive support for Additional Applied Science teachers is offered by the Nuffield Foundation and UYSEG at:

www.nuffieldfoundation.org/twenty-first-century-science

and by Oxford University Press at:

www.twentyfirstcenturyscience.org

Our publisher partner and other endorsed resources

Our official publisher partner is Oxford University Press, and they have been working with the OCR Science team, the Nuffield Foundation and the UYSEG Project Team to publish new editions of their Additional Applied Science resources.



Further details are available on the Oxford University Press website at:

www.oxfordsecondary.co.uk/twentyfirstcenturyscience

In addition, we are also endorsing the updated Additional Applied Science publications from Collins. Details of these Approved Publications are available at:

www.collinseducation.com/gcscscience2011

The cluster support network

Teachers of Additional Applied Science support one another through a network of cluster groups: local clusters of four to eight schools offering mutual support. OCR and the UYSEG Project Team are helping schools to run this network. Cluster groups are organised according to geographical areas and all centres are eligible to join. Each cluster appoints their own coordinator who organises meetings at times to suit the member centres.

OCR supports clusters by providing:

- free training for the coordinator twice a year
- resources to disseminate to the cluster members
- regular updates to the coordinator for dissemination
- a route for clarification of points raised by member centres
- a National Coordinator who maintains regular contact with the coordinators.

For information on joining an Additional Applied Science cluster group in your area, contact the University of York Science Education Group at uyseg-c21@york.ac.uk.

ESSENTIAL BOOKMARKS

www.gcse-science.com – for the latest updates and free downloads of specifications and support materials

www.scienceplanner.ocr.org.uk – our free interactive Assessment Planner to help you plan valid assessment routes

www.nuffieldfoundation.org/twenty-first-century-science – support for Additional Applied Science from the Nuffield Foundation and University of York Science Education Group (UYSEG), our development partners

www.twentyfirstcenturyscience.org – support for Additional Applied Science from Oxford University Press, our publisher partner

www.ocr.org.uk/training – for information and to book a place on our INSET courses and new online training events

www.social.ocr.org.uk – join our new Science social community for teachers, where you can participate in discussions, ask questions, and upload & download teacher-made resources

answers.ocr.org.uk – our new question & answer service, available for free 24 hours a day, where you can browse hot topics, FAQs and email us with specific questions

www.ocr.org.uk/interchange/active_results – our free results analysis service, which allows you to review the performance of individual candidates or your whole school on a unit or question-by-question basis and compare against national averages

USEFUL WEB RESOURCES

The following list of websites has been compiled from suggestions by teachers, and may be useful in teaching of Additional Applied Science.

While these websites may be useful, OCR does not contribute to or regulate them in any way, and is not responsible for any of their content or the ways in which they are used. The list is not intended to be exclusive or comprehensive, and inclusion in the list does not constitute endorsement by OCR. Website addresses are correct at the time of printing.

General

www.collinsnewgcscscience.co.uk/badscience – web resources and lesson plans based on the 'Bad Science' book and newspaper column by Ben Goldacre, unpicking scientific claims, reports and news stories

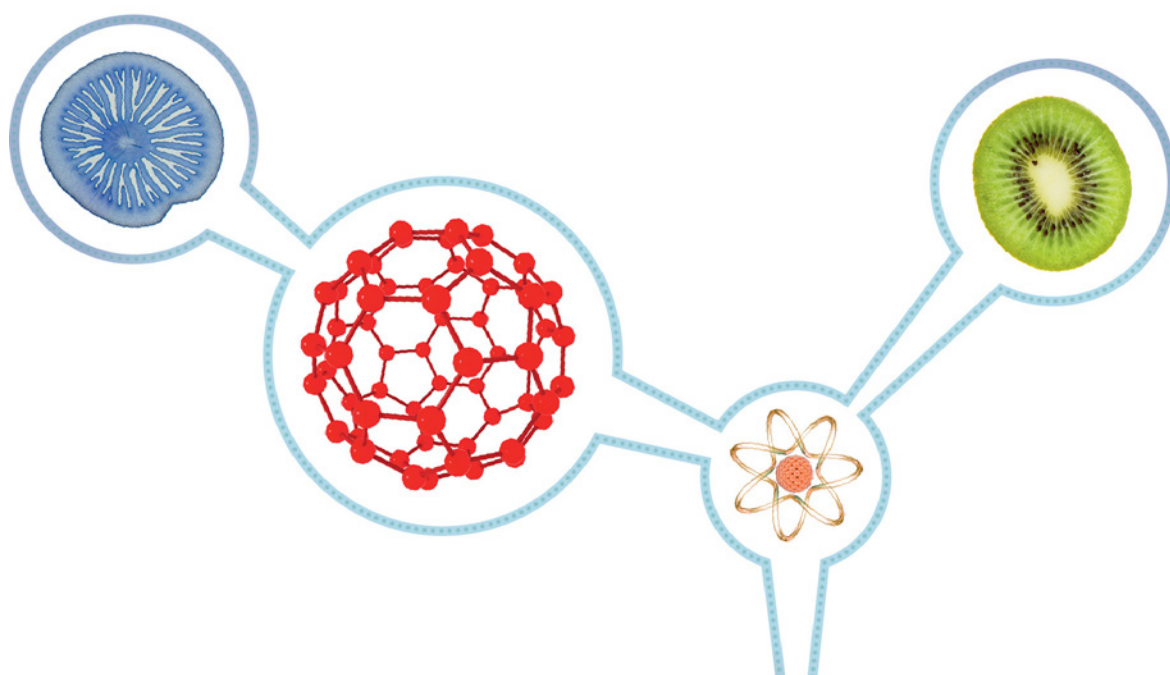
www.tes.co.uk/secondary-teaching-resources – TES list of resources for secondary teaching, including lesson plans, worksheets, activities, revision, teaching ideas and classroom resources

www.abpischools.org.uk/page/resource/age/subject.cfm?age=Age%20Range%2014%2D16 – information and interactive activities on a range of topics relevant to GCSE Science

www.explainthatstuff.com – a large collection of articles, providing easy introductions to Science concepts and technology

www.creative-science.org.uk – ideas and resources to help candidates create experiments for themselves, from the Creative Science Centre at the University of Sussex

www.s-cool.co.uk/gcse – a colourful revision site



APPENDIX A: HAZARD SYMBOLS

Specification statement B4.1.6 requires candidates to recall the chemical hazard symbols for explosive, harmful, toxic, corrosive, oxidising and highly flammable.

Teachers and technicians will be familiar with the square symbols with orange backgrounds, as defined in EEC Directive 67/548/EEC. However, this Directive will be repealed on 1 June 2015 and the symbols will no longer be used after that date.

A new set of diamond-shaped hazard symbols with white backgrounds is being introduced in Europe, in accordance with the United Nations Globally Harmonised System of Classification and Labelling of Chemicals (the "GHS"). The GHS has been adopted in Europe under the Regulation on the Classification, Labelling and Packaging of Substances and Mixtures (the "CLP").

How does this effect teaching and assessment?

Guidance for teachers and technicians about using chemicals in school has been issued by CLEAPSS in the leaflet 'An introduction to GHS / CLP chemical hazard labelling'.

Note that under the new GHS/CLP system, the familiar 'X' symbol for 'harmful' will no longer be used. Hazards previously classified as harmful will be covered by the other symbols in the new system, according to the nature of the hazard.

The period up to 1 June 2015 is considered to be a transitional period in which both sets of symbols will be in use. Hence, candidates are likely to see both sets of symbols on chemical bottles and chemical safety data sheets during the lifetime of the 2011 specification.

Candidates should be familiar with both sets of symbols, and should be able to recall both sets during assessment.

The following page shows both sets of symbols (limited to those required by specification statement B4.1.6) and can be used as a classroom handout.

HAZARD SYMBOLS

Many chemicals you use in school and at home will be labelled with hazard symbols. For your exams, you need to be able to recall the symbols for explosive, toxic, corrosive, oxidising, highly flammable and harmful.

The symbols used in Europe are changing, and between 2010 and 2015 two sets of symbols will be in use.

There is not a symbol for 'harmful' in the new system.

The 'old' symbols are square and have an orange background.



Explosive



Toxic



Corrosive



Oxidising



Highly flammable



Harmful

The 'new' symbols are diamond-shaped and have a white background.



Explosive



Toxic



Corrosive



Oxidising



Highly flammable

APPENDIX B: COMMAND WORDS

This page explains some of the command words you will see used in exam questions.

Remember that you may see other command words used in questions, and the exact way you answer a question will always depend on the information given in the question itself.

Calculate

Work out a number. You can use your calculator to help you. You may need to use an equation. The question will say if your working must be shown. (*Hint: don't confuse with 'Estimate' or 'Predict'*)

Compare

Write about the similarities and differences between two things.

Describe

Write a detailed answer that covers what happens, when it happens, and where it happens. Talk about facts and characteristics. (*Hint: don't confuse with 'Explain'*)

Discuss

Write about the issues related to a topic. You may need to talk about the opposing sides of a debate, and you may need to show the difference between ideas, opinions, and facts.

Estimate

Suggest an approximate (rough) value, without performing a full calculation or an accurate measurement. Don't just guess – use your knowledge of Science to suggest a realistic value. (*Hint: don't confuse with 'Calculate' and 'Predict'*).

Explain

Write a detailed answer that covers how and why a thing happens. Talk about mechanisms and reasons. (*Hint: don't confuse with 'Describe'*)

Evaluate

You will be given some facts, data, or other kind of information. Write about the data or facts and provide your own conclusion or opinion on them.

Justify

Give some evidence or write down an explanation to tell the examiner why you gave an answer.

Outline

Give only the key facts of the topic. You may need to set out the steps of a procedure or process – make sure you write down the steps in the correct order.

Predict

Look at some data and suggest a realistic value or outcome. You may use a calculation to help. Don't guess – look at trends in the data and use your knowledge of Science. (*Hint: don't confuse with 'Calculate' or 'Estimate'*)

Show

Write down the details, steps, or calculations needed to prove an answer that you have given.

Suggest

Think about what you've learnt and apply it to a new situation or context. Use what you have learnt to suggest sensible answers to the question.

Write down

Give a short answer, without a supporting argument.

GENERAL QUALIFICATIONS

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Facsimile 01223 552627

science@ocr.org.uk

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