

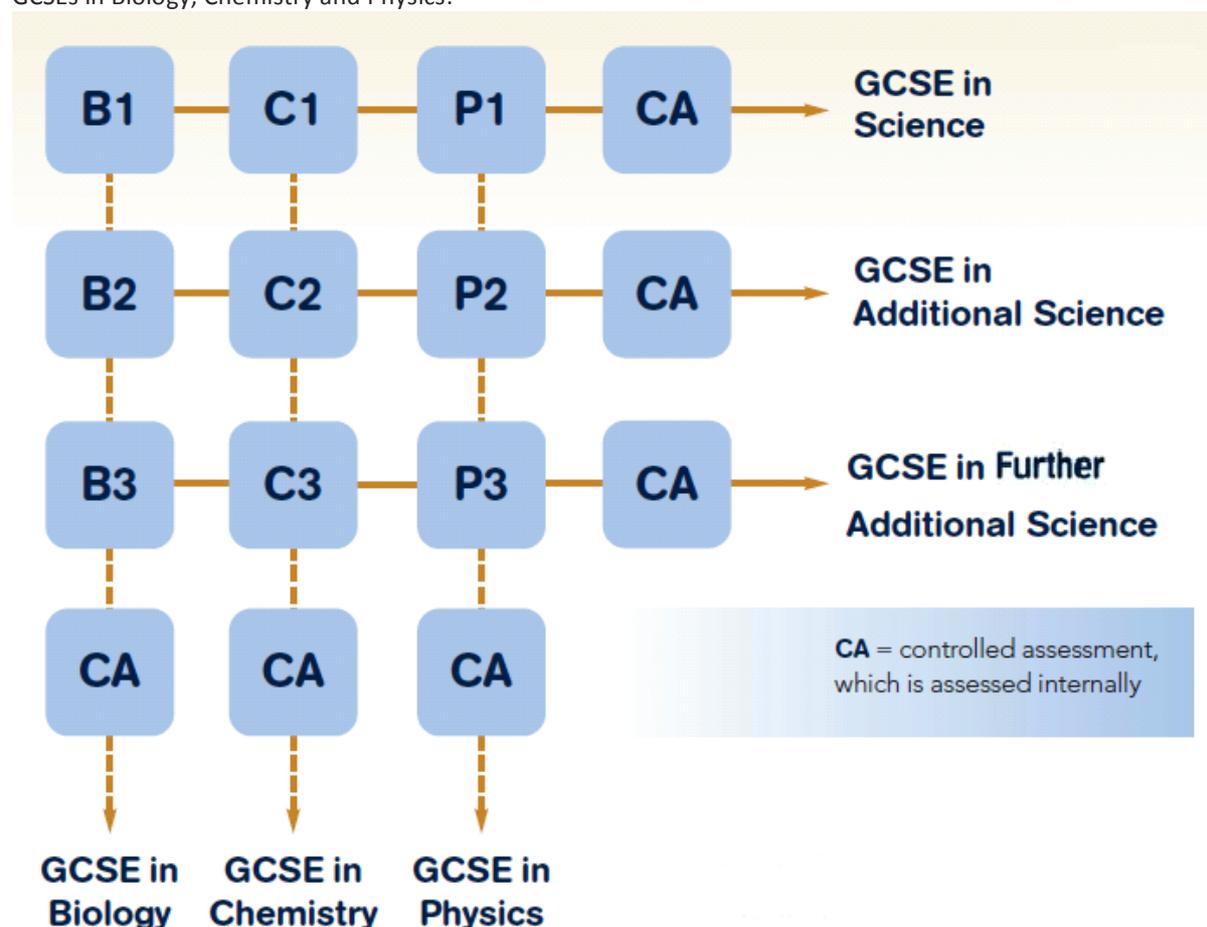
GCSE **Assessment** **Guide**

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Assessment overview

Overall qualification structure

Outlined below is the structure of GCSE in Science, GCSE in Additional Science, Further Additional Science and GCSEs in Biology, Chemistry and Physics:



In order to cash-in for any GCSE, candidates must sit three examined units and one controlled assessment unit. There are some simple rules governing the nature of the controlled assessment:

- Candidates taking GCSE in Science must take the controlled assessment unit for GCSE in Science
- Candidates taking GCSE in Additional Science must take the controlled assessment for GCSE in Additional Science
- Candidates taking GCSE Further Additional Science cannot use the same subject for their controlled assessment as they use for Additional Science. For example, if a candidate submits a Biology controlled assessment task for Additional Science, they must submit either Chemistry or Physics controlled assessment for Further Additional Science.
- Candidates taking GCSE Biology (or Chemistry or Physics) cannot use the controlled assessment associated with B1 (or C1 or P1); but can use the controlled assessment task associated with either B2 or B3 (or C2 / C3 or P2 / P3).

Sitting patterns

We would expect to see four common sitting patterns:

1. Candidates taking GCSE in Science only – these candidates would sit B1, C1, P1 and the controlled assessment for GCSE in Science.
2. Candidates taking GCSE in Science and GCSE in Additional Science – these candidates would sit B1, C1, P1 and the controlled assessment for GCSE in Science; then B2, C2, P2 and the controlled assessment for GCSE in Additional Science.
3. Candidates taking GCSE in Science, GCSE in Additional Science and GCSE in Further Additional Science – these candidates would sit B1, C1, P1 and the controlled assessment for GCSE in Science; B2, C2, P2 and the controlled assessment for GCSE in Additional Science; and B3, C3, P3 and the controlled assessment for the GCSE in Further Additional Science.
4. Candidates taking separate sciences – using Biology as an example, these candidates would sit the B1, B2, and B3 exams, and the Biology controlled assessment unit, using a controlled assessment task from either B2 or B3.

NB Candidates CANNOT use the controlled assessment task from B1 when taking separate sciences.

Candidates taking other routes through the qualification need to be aware of the rule that **no examined unit can be used to count against more than one qualification**. In other words, if a candidate takes GCSE in Science and then goes on to take GCSE in Chemistry, then he or she must sit C1 twice – once for GCSE in Science and again for GCSE in Chemistry. These two attempts must be made in different examination series.

To make administration simpler for centres, the same code will be used for these common units.

It is also worth noting that GCSE in Science followed by a single separate science (e.g. GCSE in Chemistry) would not count towards the English Baccalaureate.

The controlled assessment tasks are valid for one year. The tasks will be released one year in advance of them becoming 'live'. Each controlled assessment task will clearly show the moderation windows for which it is valid. These windows will always be May/June.

Structure of the exam

Each exam has the same structure: the paper will be one hour long and be worth 60 marks. The total will then be converted to a uniform mark of 80.

Each exam paper will contain six questions, each question finding its 'home' in a topic of the unit. Some questions may ask candidates to draw on knowledge across the topics in the unit.

The first pair of questions will be worth approximately 8 marks, with the next pair being approximately 10 marks and the final pair approximately 12 marks.

Each individual question will be ramped in difficulty. This means the starting question part is likely to be a straight forward one-mark question and the demand for each part will increase towards the end of the question. It is likely that the increasing demand will be reflected by an increase in mark allocation for the question parts.

In addition, there will also be ramping across the question paper, so that Q6 will have a higher overall demand than Q1. However, each question – even Q6 – should have an accessible beginning so that all candidates have access to all questions and candidates of lower ability do not lose confidence by facing questions of high difficulty early in the paper. For these reasons, there are no 'common' questions between Foundation and Higher Tier. Instead, the differentiation between the tiers comes from the level of demand of the questions and, to some extent, from the types of question and mark allocations for the questions.

The papers will contain a variety of question types: multiple choice, sentence completion, matching and short answers. The short answer questions will usually be worth between one and three marks, although candidates may encounter a four-mark question on the Higher Tier papers.

At Higher Tier, about one-quarter of the paper will be made up of one-mark questions; this will rise to around one-third for Foundation Tier. The remainder of the papers will be made up of two and three mark questions (with Foundation Tier having more two-mark than three-mark questions), the likelihood of a four-mark question at Higher Tier; and then the six-mark extended writing questions.

The extended writing questions are worth six marks. It is most likely that they will appear in Q5 and Q6; although there may be examples of an extended writing question appearing in Q4, allowing Q5 to be comprised of a greater number of shorter structured questions. The extended writing questions will give candidates the opportunity to show depth of knowledge, or to consider a scientific issue or practical scenario. It is likely that there will be some stimulus material to prompt the candidate's answer – this stimulus material should be accessible enough that even lower ability candidates will be encouraged to attempt these longer questions. The marking of these questions will be through a levels-based mark scheme, with candidates being placed into one of three levels based on the scientific content of the response. Each level will be a two-mark band (1 – 2 marks; 3 – 4 marks and 5 – 6 marks). The final mark within the level is influenced by the quality of written communication in the answer.

Tiering

The new GCSE in Science has two tiers: Foundation Tier for those candidates working at grades G – C; and Higher Tier for those performing at D – A*. One of the hardest decisions is where candidates performing around the C/D level should be tiered.

This will depend on your judgement, taking into account:

1. the nature of the different exam papers and whether the candidate is best suited to one-mark answers, or can often earn marks in longer answer questions
2. how the candidate would deal with Higher Tier papers – by rising to the challenge or by becoming despondent due to the difficulty
3. how likely it is that, between entry and examination, the candidate can improve performance to allow a good attempt at a Higher Tier paper
4. how well the candidate scores on practice papers at both tiers.

For Science, Additional Science and Further Additional Science routes, if a candidate is very good at two of the sciences, but weaker at the third, then remember that a good performance in one or more papers can compensate for poorer performance in another.

As you can see in the uniform mark scale examples on the following pages, Higher Tier candidates do get rewarded with uniform marks, even if they are below the official D grade cut-off for the Higher Tier papers.

Many teachers will be familiar with tiered papers where some questions – those aimed at the C/D candidates – are common to both tiers. In this specification, there are no common questions between the tiers, but there are differences between the question papers:

1. The Foundation Tier papers have questions with lower mark allocations - more 1-mark questions, with the bulk of the remaining questions being worth 2-marks, with one or two 3-mark questions and the two extended writing questions
2. The Higher Tier papers have fewer 1-mark questions, then more of a range of 2-mark and 3-mark questions, and often a 4-mark question, as well as the extended writing questions
3. The language of the papers and the degree of support given to candidates to help them access the paper is also greater in Foundation Tier.

Candidates can take a combination of Foundation and Higher papers, and this may be of use for candidates who are less strong in one of the three sciences. Candidates entered for Foundation Tier can only achieve a grade C for that paper, and this will limit the uniform marks they can score.

Reporting of marks

Each externally-assessed unit is marked out of 60 and, at Awarding, the raw mark will be converted to a uniform mark out of 80.

The internally-assessed units are marked out of 50 (for Additional Science and separate sciences), but out of 48 for GCSE Science. These raw marks, after moderation, will also be converted to uniform marks out of 80.

The uniform mark scale is always arranged (at GCSE) so that 90% of the total uniform mark is an A*, 80% is an A, 70% is a B and so on. Remember that the conversion to uniform mark is not as simple as just saying “40/60 must be 40 x 80/60 to get it to a UMS mark out of 80”. Uniform mark conversion works by fixing all grade boundary marks (A, C and F) and, using these fixed points, scaling all other marks between these grade boundaries.

This table shows uniform marks against grades for each unit.

Untiered uniform mark score (unit)	72	64	56	48	40	32	24	16
Foundation Tier uniform mark score (unit)			(55)	48	40	32	24	16
Higher Tier uniform mark score (unit)	72	64	56	48	40	36		
Grade	A*	A	B	C	D	E	F	G

Remember that the different tiers target different grades, and so the range of uniform marks available to candidates at each tier is different. A candidate taking a Foundation Tier paper can only score a C grade at the very best and so the range of UMS marks available on the paper would be from 0 to 55. For Higher Tier candidates, the highest possible UMS mark is 80. The Higher Tier paper is aimed at A* – D (and an allowed E) so the ‘normal’ range of uniform marks goes down to 36 uniform marks. Higher Tier candidates who do not score enough marks to be awarded an E grade are not given a uniform mark of 0 – they are given uniform marks on a scale from 36 down to 0, depending on their raw mark, although the grade reported to them will still be ‘U’.

You may be more used to the total uniform mark score for a paper being 100 (and the numbers therefore being a little easier) – for technical reasons this was not used for GCSE in Science. However, this table will enable you to match the uniform mark score on a paper to a grade with ease.



This table shows full uniform marks against qualification grades

Untiered uniform mark score (GCSE)	288	256	224	192	160	128	96	64
Grade	A*	A	B	C	D	E	F	G

As each GCSE comprises four units, the **uniform mark** total for each GCSE is 320. Again, 90% of the total **uniform marks** would yield an A* grade, 80% an A grade and so on.

For an example, a teacher estimates that a candidate is working around the C/D boundary and performs better in biology and chemistry than he does in physics. The candidate is therefore entered for B1 and C1 at Higher Tier, but P1 at Foundation Tier. His results (in uniform marks) are 48 for B1 (C grade), 42 for C1 (D grade) and 34 for P1 (E grade). The candidate also scores 40 for the controlled assessment, making a total for GCSE Science of 164 uniform marks (D grade).

If the same candidate had been entered for all the units B1, C1 and P1 at Higher Tier, it is likely that his performance on the more demanding P1 Higher Tier paper would be poorer. As the decrease in uniform marks below D grade is quite rapid at Higher Tier, he may achieve a lower uniform mark on the Higher Tier paper than on the Foundation Tier. Hence, if this candidate scored the same uniform marks of 48 for B1, 42 for C1 and 40 for the controlled assessment, but only 28 uniform marks for P1, the overall uniform mark for GCSE Science would be 158 (E grade).



Controlled Assessment Explained

To allow pupils to experience what a full investigation is like, within the limitations of a real school environment, the controlled assessments have been split into three parts:

- **Part A – Planning**
- **Part B – Observations**
- **Part C – Conclusions**

For each controlled assessment we produce:

- **The controlled assessment task**, comprising of:
 - a student brief
 - technician notes.
- A **student checklist**
- **Specific marking criteria**. There is also a set of **generic marking criteria**. All controlled assessments are written to this generic criteria regardless of subject. This means that you can apply generic criteria to award marks where a candidate gives an answer that you see is correct, but falls outside the specific marking guidance for that controlled assessment.



Controlled assessment task – Parts A, B and C

Remember:

- The plan in Part A is used in Parts B and C. This is a change requested by Ofqual. To ensure a poor plan will not negatively affect a candidate's entire controlled assessment, and that the method carried out is safe, a method will be provided by Edexcel for use in such circumstances. In this circumstance, the candidate loses marks in Part A but can still access all marks in Parts B and C.
- The results collected in Part B are needed for Part C.
- For Science, candidates do **not** have to formulate a hypothesis, however this will be required for Additional Science and Biology, Chemistry and Physics.
- The hypothesis stated in Part A (for Science) or written by the candidates (for Additional Science and the Separate Sciences) is required in Part C for candidates to access marks.
- As clarified by Ofqual, secondary evidence must now be collected by the candidate, e.g. from the internet or a range of text books. We have included this in Part B and are investigating ways to support you in ensuring candidates can find appropriate evidence. In Part C, marks are now awarded for processing the evidence that the candidate has managed to collect, rather than awarding separate marks for processing primary and secondary evidence.
- For Science, Additional Science AND Further Additional Science, you can submit marks for the best of the candidate's work. For example, Part A from Biology, Part B from Chemistry and Part C from Physics (or any combination of subjects). For separate sciences, parts can be taken from practicals based on Units 2 or 3 or combination of both. All work for a task needs to be submitted, rather than just the Part for which the mark is being submitted. This enables moderators to evaluate all three Parts on the controlled assessment tasks within the correct context.
- Controlled assessments based on a practical from any Unit 2 can be used to count towards Additional Science or a separate science as long as they are from the correct subject area. For separate sciences, parts can be taken from practicals based on Units 2 or 3 or combination of both. For example, the controlled assessment for Unit B2 can be used by a candidate to cash-in for GCSE Additional Science or GCSE Biology. A candidate who has a mixture of marks from the controlled assessments for Units B2 and C2 can only use these marks for GCSE Additional Science and not for either separate science.
- Candidates taking GCSE Further Additional Science cannot use the same subject for their controlled assessment as they use for Additional Science. For example, if a candidate submits a Biology controlled assessment task for Additional Science, they must submit either a Chemistry or Physics controlled assessment task for Further Additional Science. If a candidate submits part marks from different controlled assessment tasks in Additional Science, they may not submit marks from the same subject for the same part in Further Additional Science. For example, if they submit marks for their Part A from Chemistry or Additional Science, they must submit a mark for Part A from either Biology or Physics in Further Additional Science.
- Controlled assessments can only be submitted for moderation in the year in which they are valid.

Student checklist

A controlled assessment checklist can be used by students to help them check that the work they are doing covers the marking criteria. These are available to download from www.edexcel.com/science2011

15.11.2010

Edexcel GCSE	
Controlled Assessment checklist	
For Science	

Part A - Planning

Ask yourself	Marks
Equipment Have I shown what equipment I need? Have I explained why I need each piece of equipment?	4
Controls Have I explained the ways I will control the task? or Have I explained how to control the variables in this task?	6
Risks Have I identified the risks in this experiment? Have I explained how I will manage these risks?	
Overall plan Have I explained how my method and the measurements or observations I will make will test the hypothesis?	

Part B - Observations

Ask yourself
Primary evidence and recording Have I recorded my primary evidence?
Secondary evidence Have I recorded my secondary evidence? Have I stated where my secondary evidence was found? Have I checked whether it will help prove or disprove my hypothesis? Have I commented on the quality of the source of my secondary evidence?

Part C - Conclusions

Ask yourself	Marks
Processing evidence Have I processed my evidence to help me form a conclusion? Have I used any appropriate mathematical skills to process the evidence? Have I presented my processed evidence?	4
Quality of evidence Have I identified any anomalies in my primary evidence or secondary evidence? Have I dealt with any anomalies in all the collected evidence (or explained that there were none)?	4
Conclusions based on evidence Have I explained what conclusions I can draw from the collected evidence? Have I used my conclusion to explain if my hypothesis is correct or not?	6
Evaluation of conclusion Have I shown how well my evidence and other scientific ideas support my conclusion? Have I described what evidence I could have collected to better support my conclusion?	4
Evaluation of method Have I described any strengths or weaknesses in my method? Have I explained how these affected the evidence collected? Have I given reasons for the anomalies in the evidence? Have I explained whether the method allowed me to collect enough evidence to support the hypothesis? Have I explained how I could improve the method to better test the hypothesis by: <ul style="list-style-type: none"> • improving the quality of the evidence collected • minimising the risk of anomalies? 	6

15.11.2010

Edexcel GCSE

Controlled Assessment checklist

For Additional Science, Biology, Chemistry and Physics

Part A - Planning

Ask yourself	Marks
Hypothesis Have I made a hypothesis? Have I explained my hypothesis using scientific ideas?	4
Equipment Have I shown what equipment I need? Have I explained why I need each piece of equipment?	2
Controls Have I explained the ways I will control the task? or Have I explained how to control the variables in this task?	
Risks Have I identified the risks in this experiment? Have I explained how I will manage these risks?	
Overall plan Have I explained how my method and the measurements/observations I will make will test the hypothesis?	

Part B - Observations

Ask yourself
Primary evidence and recording Have I recorded my primary evidence?
Secondary evidence Have I recorded my secondary evidence? Have I stated where my secondary evidence was found? Have I checked whether it will help prove or disprove my hypothesis? Have I commented on the quality of the source of my secondary evidence?

15.11.2010

Part C - Conclusions

Ask yourself	Marks
Processing evidence Have I processed my evidence to help me form a conclusion? Have I used any appropriate mathematical skills to process the evidence? Have I presented my processed evidence?	4
Quality of evidence Have I identified any anomalies in my primary evidence or secondary evidence? Have I dealt with any anomalies in all the collected evidence (or explained that there were none)?	4
Conclusions based on evidence Have I explained what conclusions I can draw from the collected evidence? Have I used my conclusion to explain if my hypothesis is correct or not?	6
Evaluation of conclusion Have I shown how well my evidence and other scientific ideas support my conclusion? Have I described what evidence I could have collected to better support my conclusion?	4
Evaluation of method Have I described any strengths or weaknesses in my method? Have I explained how these affected the evidence collected? Have I given reasons for the anomalies in the evidence? Have I explained whether the method allowed me to collect enough evidence to support the hypothesis? Have I explained how I could improve the method to better test the hypothesis by: <ul style="list-style-type: none"> • improving the quality of the evidence collected • minimising the risk of anomalies? 	6

Sample controlled assessment – C2

The following pages contain one of the sample controlled assessment tasks that are available to download from www.edexcel.com/science2011.

Edexcel GCSE

Additional Science

Unit ASCA: Additional Science Controlled Assessment

Chemistry

Unit CCA: Chemistry Controlled Assessment

Sample Controlled Assessment

Task C2

Paper Reference(s)

5SA04/01

5CH04/01

This Controlled Assessment Task may be submitted for moderation in either MAY XXXX or OCTOBER XXXX.

Submission of this Controlled Assessment Task at any other time will result in it being returned to the centre unmoderated with no result issued.

Turn over ►

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Task C2

Specification reference 5.1

Measure temperature changes accompanying some of the following types of change:

- b neutralisation reactions

Student Brief

This controlled assessment is about neutralisation reactions, which take place when an acid reacts with an alkali.

Neutralisation reactions are exothermic, and the temperature rise depends on a number of factors, including:

- the concentration of the acid or the alkali
- the volume of the acid or the alkali
- which acid and alkali are used.

Plan an investigation to find out how a factor affects the temperature rise in neutralisation reactions.

You will be given the following resources:

Aqueous sodium hydroxide, dilute hydrochloric acid.

Part A – Planning

How to attempt the task:

You must produce a plan.

The plan must include:

- a hypothesis that you are planning to test
- an explanation of which equipment you need to complete the task. You may want to draw a diagram of how the equipment will be set up
- which variable (or variables) you will change and which you will keep the same
- which measurements you should make to test the hypothesis, explaining how these will test the hypothesis, and including the number and range of measurements
- any risks that are linked to the practical task and how you can reduce these to make your practical task safer.

You should check that the overall plan is clear and will produce a range of results that will test the hypothesis.

Part B – Observations

You are going to investigate how different factors affect temperature changes in neutralisation reactions.

You will test **your** hypothesis using your own method, from Part A.

You should also collect some secondary evidence on neutralisation reactions.

How to attempt the task:

- You should decide on the number and range of measurements you will make.
- Complete the practical task, recording your measurements clearly and accurately.
- Collect some secondary evidence on this task.
- Comment on the quality of the source of this secondary evidence.

Part C – Conclusions

You will need your primary and secondary evidence from the Part B – Observations task and information about the method you used.

How to attempt the task:

You must process your primary and secondary evidence from Part B and present these, using mathematical processes if relevant.

You must produce a conclusion in which you:

- review all of the primary and secondary evidence, then identify and deal with any anomalies
- draw conclusions from this processed evidence to prove or disprove a hypothesis
- show how the data supports the conclusion
- explain how you might change the method if you were going to repeat the investigation
- describe the primary and secondary evidence you might collect to extend your investigation and say why you would collect it.

Teachers' notes

We provide notes for teachers and technicians for each of the controlled assessment tasks. These provide guidance on the type of equipment required to complete the tasks and can be downloaded from www.edexcel.com/science2011.

Teacher and technician notes

Method for Part B

Candidates should follow the method they produced in Part A to collect observations. However, if they do not produce a plan or their plan is either unsafe or will not produce results, then a method can be given. Here is an example:

1. Fill the burette with dilute hydrochloric acid, making sure the tip below the tap is also full.
2. Place 25 cm³ of aqueous sodium hydroxide in a polystyrene cup supported in a beaker.
3. Place a thermometer in the aqueous sodium hydroxide and record the initial temperature. Leave the thermometer in the solution throughout the rest of the experiment.
4. Place the polystyrene cup under the burette. Add 5 cm³ of dilute hydrochloric acid, making sure that it does not fall directly on the thermometer. Stir the mixture with the thermometer and record the temperature.
5. **Without delay**, add a further 5 cm³ of dilute hydrochloric acid to the polystyrene cup, stir and record the temperature.
7. Continue adding the dilute hydrochloric acid in 5 cm³ amounts, stirring and record the temperature after each addition. Stop adding the acid when 50 cm³ has been added.

Students must observe safe practice when they are carrying out controlled assessment tasks. It is the responsibility of centres to carry out risk assessments for all controlled assessment tasks that they undertake with their students.

Part B - Technician notes

Each group are likely to need the following set of apparatus*:

- thermometer
- a polystyrene cup supported in a beaker
- 25 cm³ measuring cylinder
- burette and stand
- plastic funnel to fit burette
- safety goggles
- access to 1 mol dm⁻³ hydrochloric acid IRRITANT
- access to 1 mol dm⁻³ aqueous sodium hydroxide CORROSIVE

The solutions should be poured into labelled beakers. Each group will need approximately 30 cm³ of aqueous sodium hydroxide and 70 cm³ of dilute hydrochloric acid. The groups can share the beakers of solutions.

*we advise that you check the exact methods candidates have planned since some may have planned to use other equipment.

Students must observe safe practice when they are carrying out controlled assessment tasks. It is the responsibility of centres to carry out risk assessments for all controlled assessment tasks that they undertake with their students.

Specific marking criteria and generic marking criteria

Remember:

- You can mark with the specific marking criteria
- The generic criteria ensure all assessments are of similar demand
- The generic criteria can be used as a guide to awarding a mark if you feel a student has made a plausible answer that falls outside the specific marking criteria. You will need to annotate the script to explain this decision to your moderator.
- Interim marks can be awarded and the marking criteria are not hurdled. For example, for Part A – Planning – Choosing equipment, these are the generic criteria:

Element	Marks		Criteria
Equipment	4	0 marks	No relevant detail given
		1-2 marks	a) Some relevant resources/equipment chosen b) Reasons for choices are described
		3-4 marks	a) Most relevant resources/equipment chosen and choices explained b) Reasons for choices are explained and fully relevant to plan

- 1 mark could be awarded if a candidate mentions some resources but makes no explanation for their choices
- 2 marks could be awarded if most resources are mentioned, but no explanation of the choices is made
- 3 marks could be awarded if most resources are mentioned, but an explanation is given that only covers some of the choices made.

Specific Marking guidance for C2

Part A – Planning

Element	Marks	Criteria	
Equipment	2	0 marks	No relevant detail given
		1-2 marks	<p>a) Specifies most of the following: polystyrene cup; thermometer; measuring cylinders; burette; a named acid; a named alkali; eye protection (give benefit of doubt for the occasional omission).</p> <p>b) Explains why the equipment/materials above have been chosen. For example: polystyrene cup as it's a good insulator and so reduces heat loss; suitable measuring cylinders or burettes to measure suitable volumes of acid and alkali.</p>
Controls	6	0 marks	No relevant controls are given.
		1-2 marks	<p>a) Identifies one appropriate variable to control that the student is not investigating from the following list: volume of acid or alkali; concentration of acid or alkali; named acid and alkali.</p> <p>b) Describes how one of the above is controlled. For example, specifies a volume of acid to measure out with a measuring cylinder/burette/pipette.</p>
		3-4 marks	<p>a) Identifies some appropriate variables to control that the student is not investigating from the following list: volume of acid or alkali; concentration of acid or alkali; named acid and alkali.</p> <p>b) Describes how the above variables are controlled, e.g. specifies a volume of acid or alkali to measure out with a measuring cylinder/ burette/pipette.</p>
		5-6 marks	<p>a) Identifies all appropriate variables to control that the student is not investigating from the following list: volume of acid or alkali; concentration of acid or alkali; named acid and alkali.</p> <p>b) Explains why the above variables are controlled, e.g. specifies a volume of acid or alkali to measure out with a measuring cylinder/ burette/pipette, to ensure the number of ions remains the same.</p>



Element	Marks	Criteria	
Hypothesis	4	0 marks	No relevant hypothesis is provided.
		1-2 marks	<p>a) Says that: higher concentrations of acid or alkali will give a greater temperature rise; or higher volume of acid or alkali will give a greater temperature rise; or stronger acid or alkali will give a greater temperature rise.</p> <p>b) Suggests that when concentration of acid or alkali is higher, or volume of acid/alkali is higher, there are more particles available to react, so temperature rise is higher.</p>
		3-4 marks	<p>a) Says that: higher concentrations of acid or alkali will give a greater temperature rise; and/or higher volume of acid or alkali will give a greater temperature rise due to increased number of ions reacting; and/or stronger acid or alkali will give a greater temperature rise.</p> <p>b) Suggests that higher concentrations of acid or alkali contain more ions in the same volume so more reactions can take place and therefore more energy is released/there is a greater temperature rise. May refer to energy released as bonds form in water.</p>
Risks	4	0 marks	No relevant details are given.
		1-2 marks	<p>a) Identifies one risk, such as: acids and alkalis are irritant/corrosive; splashes from acid/alkali; polystyrene cup may tip over if thermometer left standing in it. No marks for saying 'do not eat and drink in the lab'.</p> <p>b) One of the following suggestions needed: care when handling solutions; wash splashes off skin immediately; take thermometer out of polystyrene cup when not in use.</p>
		3-4 marks	<p>a) Identifies relevant risks, such as: acids and alkalis are irritant/corrosive; splashes from acid/alkali; polystyrene cup may tip over if thermometer left standing in it.</p> <p>b) Plan reflects how risks need to be managed, e.g. choices of equipment justified in terms of choosing safest option, method notes removal of thermometer between uses.</p>

Element	Marks	Criteria
Overall plan	0 marks	No relevant plan is given.
	1-2 marks	<p>a) Overall plan is logically ordered to produce results, e.g. notes the need for repeat readings, and method clearly shows how the identified range will be measured and identified variables controlled.</p> <p>b) Specifies a range of acid or alkali concentrations that will be used, e.g. 100%, 80% etc. of original concentration. This may be by specifying volumes of acid or alkali and water.</p> <p>Or specifies a range of volumes of acid or alkali to be used, for example, 25 cm³ of one and 5 cm³, 10 cm³, 15 cm³ etc. of the other.</p> <p>Or specifies a range of different named acids and alkalis, e.g. hydrochloric acid, sulfuric acid, ethanoic acid, sodium hydroxide, potassium hydroxide, aqueous ammonia.</p>
	3-4 marks	<p>a) Overall plan is logically ordered to produce results, e.g. notes the need for repeat readings, and method clearly shows how the identified range will be measured and identified variables controlled. Shows how, for example, measuring temperature rises for a known range of volumes, will test the hypothesis.</p> <p>b) Explains why particular range of acid or alkali concentrations has been chosen, e.g. suggests that they cannot be made more concentrated so have to dilute with water and decides about five different concentrations so a graph can be plotted.</p> <p>Or explains that volumes are suitable to measure with measuring cylinder/burette/graduated pipette and decides about five different volumes so a graph can be plotted.</p> <p>Or explains that a range of different acids and alkalis are needed and specifies at least one strong and one weak acid and alkali.</p>
Total Marks	20	

Part B – Observations

Element	Marks	Criteria
Primary evidence and recording	0 marks	No primary evidence is collected
	1 mark	Some temperature and volume data is recorded
	2 marks	A suitable range of volumes tested (0 to 50cm ³) and is recorded in a table.
	3 marks	A suitable range of volumes tested (0 to 50cm ³) and is recorded in a properly labelled table, including units in cm ³ and °C.
	4 marks	A suitable range of volumes tested (0 to 50cm ³) and is recorded in a properly labelled table, including units in cm ³ and °C. Repeat readings are taken.
Secondary evidence	0 marks	No secondary evidence is collected
	1 mark	Secondary evidence can be found from the Internet or textbooks and needs to be relevant to the hypothesis. This can be in the form of data, e.g. on energy required to break bonds, or a relevant theory, e.g. that energy is released during dissolution and/or neutralisation.
	2 marks	<p>Secondary evidence can be found from the Internet or textbooks and needs to be relevant to the hypothesis. This can be in the form of data, e.g. on energy required to break bonds, or relevant theory, e.g. that energy is released during neutralisation.</p> <p>Students need to comment on the credibility of the source(s) of the secondary evidence and why they have chosen to use it, e.g. whether it has been reviewed and supports scientific theory.</p>
Total Marks	6	



Part C – Conclusions

Element	Marks	Criteria	
Processing evidence	4	0 marks	Evidence is not processed.
		1-2 marks	a) Attempts to process all the evidence in Part B, using appropriate mathematical skills, to work out the maximum temperature. b) Attempts a bar chart or simple line graph to present volume of hydrochloric acid and temperature (results to Part B). Errors apparent in axes/scales/plotting. Highlights parts of secondary evidence, if collected, that relate to the graph.
		3-4 marks	a) Fully processes all the evidence in Part B, using appropriate mathematical skills, drawing two best-fit lines, and calculates the energy change for their experiment. b) Draws a correctly constructed line graph to present volume of hydrochloric acid and temperature (use professional judgement for minor errors). Highlights parts of secondary evidence, if collected, that relate to the graph.

Element	Marks		Criteria
Quality of evidence	4	0 marks	No comments are made on the quality of the evidence.
		1-2 marks	<p>a) Comments on the quality of the primary evidence, identifying any anomalies and excluding them (if no anomalies in evidence candidates need to state this). Identifies that the data obtained follows a pattern, e.g. For example comments on whether all points are close to the line of best fit on the graph and relates this to the quality of the evidence, or comments on how close together repeat readings are.</p> <p>b) Comments on the quality of the secondary evidence, identifying any anomalies and excluding them (if no anomalies in evidence candidates need to state this). For example, comments on whether all points are close to line of best fit if graph drawn using data from secondary sources, or compares secondary evidence with primary evidence and comments on method(s) used to obtain secondary evidence.</p>
		3-4 marks	<p>a) Explanation given for the adjustment of evidence, such as the exclusion of anomalous evidence, e.g. repeat readings indicate one measurement is out of line or sources of secondary evidence contradict and less credible sources are discounted.</p> <p>b) Reprocesses the primary and secondary evidence after taking account of anomalies, e.g. re-drawing lines of best fit on the graph.</p>

Element	Marks	Criteria	
Conclusions based on evidence	6	0 marks	No relevant conclusions are made.
		1-2 marks	<p>a) Makes a relevant conclusion, such as when the volume of hydrochloric acid increases, the temperature increases then decreases.</p> <p>b) Tries to use data from Part B to support conclusion, e.g. the graph goes up, reaches a maximum temperature, then goes down again. May attempt to use secondary evidence to support the conclusion. Attempts to use mathematical relationships in the conclusion, e.g. may say that initially there is (positive) correlation between the volume of acid and temperature change.</p>
		3-4 marks	<p>a) Makes a conclusion, e.g. a higher volume of hydrochloric acid gives a greater temperature rise, or a higher concentration of acid / alkali gives a greater temperature rise, which supports the hypothesis.</p> <p>b) Uses data from Part B to support conclusion, e.g. the temperature increased by $x^{\circ}\text{C}$ when y cm³ of hydrochloric acid had been added then it fell to $z^{\circ}\text{C}$. May attempt to use secondary evidence to support the conclusion. Uses mathematical relationships in the conclusion, e.g. may refer to proportionality between volume (or concentration) of acid and temperature rise up to the point where the maximum temperature was reached.</p>
		5-6 marks	<p>a) Uses data and evidence to draw conclusion(s) about the effect of volume of hydrochloric acid on the temperature rise. Calculates the energy change from primary evidence. Comments on extent to which the evidence support the hypothesis.</p> <p>b) Uses data and evidence to support conclusion, e.g. the temperature increases as the volume of hydrochloric acid increases as it is neutralising more of the sodium hydroxide and the temperature decreases as all the sodium hydroxide has been neutralised and excess hydrochloric acid is added. May attempt to use secondary evidence to support conclusion. Uses mathematical relationships in the conclusion, e.g. refers to direct proportionality between volume (or concentration) of acid and temperature rise up to the point where the maximum temperature was reached.</p>

Element	Marks		Criteria
Evaluation of conclusion	4	0 marks	No relevant evaluation is made.
		1-2 marks	a) Conclusion is evaluated based on all collected evidence, e.g. whether primary and secondary evidence lead to the same conclusion or contradict each other. b) Suggests how all collected evidence can be improved to provide stronger support for the conclusion, e.g. looking for data-based secondary evidence to allow direct comparisons.
		3-4 marks	a) Conclusion is evaluated based on all collected evidence and relevant scientific ideas, e.g. whether primary and secondary evidence lead to the same conclusion or contradict each other and whether they fit with relevant scientific ideas. b) Suggests how all collected evidence can be improved and extended, e.g. by testing a range of acids or by including ions with 2+ charges, to provide stronger support for the conclusion.



Element	Marks	Criteria	
Evaluation of method	6	0 marks	No relevant evaluation is made.
		1-2 marks	<p>a) Notes a 'good point' or 'bad point' about the method to Part B e.g. polystyrene is a good insulator/prevents heat loss or difficult to use the burette accurately/quickly enough.</p> <p>b) Makes and justifies a sensible suggestion about how the method could be improved, but doesn't have to be linked to the comment made in a).</p>
		3-4 marks	<p>a) Describes strengths or weaknesses in the method to Part B and reasons for any anomalies. This may be something found while doing the experiment. For example: a comment on the ease of using the burette (to deliver an appropriate volume); stirring with the thermometer; the volume of hydrochloric acid may not have increased by exactly 2 cm³ each time so the temperature will be incorrect.</p> <p>b) Makes suggestions about how the method could be improved, ideally linked to the comments made in a). Gives reasons why these improvements are needed, e.g. repeating the experiment will lead to better information on temperature changes, which helps test the hypothesis.</p>
		5-6 marks	<p>a) Describes strengths and weaknesses in the method to Part B and relates these to the hypothesis. Comments on how the quality of the data has been influenced by these points, e.g. if the volume of hydrochloric acid was not exact, the temperature will be incorrect.</p> <p>b) Makes suggestions about how the method could be improved, linked to the comments made in a). Gives reasons why these improvements are needed and explains clearly how better quality evidence would be collected. For example: record the exact volume of hydrochloric acid used; use a magnetic stirrer; repeat the experiment.</p>
Total Marks	24		

Generic marking criteria

Part A – Planning

Element	Marks	Criteria	
Equipment	2	0 marks	Gives no relevant detail
		1-2 marks	a) Chooses most relevant resources/equipment b) Explains reasons for choices and choices are fully relevant to method
Controls (If variables are to be controlled, criteria a1 and b1 will be used. If there are no variables to control, criteria a2 and b2 will be used. The specific criteria needed will be in the controlled assessment task.)	6	0 marks	Gives no relevant controls
		1-2 marks	a1) Identifies one appropriate variable to control b1) Describes how this variable can be controlled OR a2) Identifies one appropriate way to control the task b2) Describes this way of controlling the task
		3-4 marks	a1) Identifies some relevant variables to control b1) Gives an appropriate description of how to control these variables OR a2) Identifies some relevant ways to control the task to produce meaningful results b2) Describes how these ways control the task
		5-6 marks	a1) Identifies a range of variables appropriate to control b1) Gives an appropriate explanation of how to control these variables OR a2) Provides a comprehensive list of relevant ways to control the task to produce meaningful results b2) Explains how these ways control the task



Element	Marks	Criteria
Hypothesis	4	0 marks Provides no relevant hypothesis
		1-2 marks a) Provides a hypothesis that is appropriate for most of the task b) Partially justifies the hypothesis
		3-4 marks a) Provides a hypothesis that is appropriate for the full scope of the task, based on relevant scientific ideas b) Justifies the hypothesis fully, using relevant scientific ideas
Risks	4	0 marks No relevant detail given
		1-2 marks a) Identifies a relevant risk which is specific to the task b) Suggests measure(s) to manage the risk
		3-4 marks a) Identifies most of the relevant risks which are specific to the task b) Method reflects how risks need to be managed
Overall plan	4	0 marks Gives no relevant method
		1-2 marks a) Method is logically ordered to produce results b) Chooses range of data/observations that would test the hypothesis
		3-4 marks a) Method is logically ordered to produce results and includes an explanation of why it would test the hypothesis b) Chooses range of data/observations that would test the hypothesis and explains why the range was chosen
Total Marks	20	

Part B – Observations

Element	Marks	Criteria
Primary evidence and recording	0 marks	Collects no primary evidence
	1 mark	Records some data /observations that are appropriate for the topic
	2 marks	Collects a suitable range of data /observations made and records some appropriately (depends on the practical)
	3 marks	Collects a suitable range of data /observations made and records all appropriately (depends on the practical)
	4 marks	Collects a suitable range of data /observations made and records all appropriately (depends on the practical) and records further/repeat data
Secondary evidence	0 marks	Collects no secondary evidence
	1 mark	Collects and records secondary evidence relevant to the hypothesis in a way appropriate for the topic
	2 marks	Collects and records secondary evidence relevant to the hypothesis in a way appropriate for the topic. Comments on the quality of the sources of secondary evidence
Total Marks	6	



Part C – Conclusions

Element	Marks	Criteria	
Processing evidence	4	0 marks	Evidence is not processed
		1-2 marks	<ul style="list-style-type: none"> a) Attempts to process all collected evidence, using appropriate mathematical skills b) Attempts to present the processed evidence in a way appropriate for the topic
		3-4 marks	<ul style="list-style-type: none"> a) Processes all collected evidence in a way that is appropriate to the task, using appropriate mathematical skills b) Presents processed evidence in a way that allows conclusions to be drawn
Quality of evidence	4	0 marks	Makes no comments on the quality of the evidence
		1-2 marks	<ul style="list-style-type: none"> a) Comments on the quality of the primary evidence, dealing with anomalies appropriately (if no anomalies in evidence, candidates need to state this) b) Comments on the quality of the secondary evidence, dealing with anomalies appropriately (if no anomalies in evidence, candidates need to state this)
		3-4 marks	<ul style="list-style-type: none"> a) Explains any adjustments to the evidence needed, or decision not to exclude evidence b) Takes account of anomalies in primary and secondary evidence when processing evidence (using all evidence if anomalies)

Element	Marks	Criteria	
Conclusions based on evidence	6	0 marks	Makes no relevant conclusions
		1-2 marks	<ul style="list-style-type: none"> a) Provides a conclusion based on all collected evidence, but does not link to the hypothesis b) Attempts to explain the conclusion using all collected evidence, including appropriate mathematical relationships
		3-4 marks	<ul style="list-style-type: none"> a) Provides a conclusion which refers to the hypothesis based on all collected evidence b) Explains the conclusion using the evidence, including appropriate mathematical relationships
		5-6 marks	<ul style="list-style-type: none"> a) Provides a conclusion which refers to the hypothesis based on all collected evidence and relevant scientific ideas b) Explains the conclusions using relevant scientific ideas and all collected evidence, including appropriate mathematical relationships
Evaluation of conclusion	4	0 marks	Makes no relevant evaluation
		1-2 marks	<ul style="list-style-type: none"> a) Evaluates conclusion based on all collected evidence b) Suggests how all collected evidence can be improved to provide stronger support for the conclusion
		3-4 marks	<ul style="list-style-type: none"> a) Evaluates conclusion based on all collected evidence and relevant scientific ideas b) Suggests how all collected evidence can be improved and extended to provide stronger support for the conclusion

Element	Marks	Criteria	
Evaluation of method	6	0 marks	Makes no relevant evaluation
		1-2 marks	<ul style="list-style-type: none"> a) Identifies a strength or weakness in the method b) Suggests how to improve method and justifies comments made
		3-4 marks	<ul style="list-style-type: none"> a) Describes strengths or weaknesses in the method and reasons for any anomalies b) Suggests how to improve method and justifies comments made relating to the quality of the evidence collected (including reasons for anomalies)
		5-6 marks	<ul style="list-style-type: none"> a) Describes strengths and weaknesses in the method and relates them to the hypothesis, and reasons for any anomalies b) Suggests how to improve method, justifying comments made relating to the hypothesis and how better quality evidence could be produced (including reasons for any anomalies)
Total Marks	24		



Question papers – question types and specimen answers

There are several different types of question which might appear in our examination papers. In this guide, we'll look at each of these question types, and, using trial data, look at some examples of the way in which students respond to these questions.

The four types of question we'll consider will be:

- 1) multiple choice
- 2) closed response
- 3) open response (structured)
- 4) extended writing

Multiple choice

First of all, it's important for your students to be familiar with the style of multiple-choice questions – we do put the instructions (or rubric) onto the front cover of the paper. However, candidates don't always read the front cover, so make sure they know what to do.

Here's an example question:

(c) Which of the following is needed for aerobic respiration?		
A	oxygen	<input type="checkbox"/>
B	carbon dioxide	<input type="checkbox"/>
C	energy	<input type="checkbox"/>
D	lactic acid	<input type="checkbox"/>

The candidate should answer this by filling a cross into the box corresponding to their answer.

If the candidate then changes his or her mind about the answer, the procedure is to strike through the box and to complete a new box.

Note that these questions are marked automatically by computer, so candidates who answer in ways that do not correspond to the rubric (e.g. by simply writing the correct answer to the right of the question, or by circling the correct letter) are unlikely to get the mark.

The exams will probably contain one multiple choice item in each of the six questions on the paper. It may be that some questions on the paper have more than one multiple choice items and others have none, but the total number of multiple choice items should be around 6 on each exam paper.



Closed response

Essentially, a closed response question is one in which the candidate does not have to come up with the answer: instead, candidates select the correct word or words from a selection given on the exam paper (sometimes this type of question is known as sentence completion); or candidates join boxes containing complementary parts of the answer.

We try to design these questions so that there isn't a forced choice. For example, if we want candidates to link the words "carbohydrate", "protein" and "fat" to foods rich in these molecules, then we'd make sure that there were more than three foods given in the linking boxes.

Let's look at some examples:

Use a word from the box to complete the sentence

argon	hydrogen	nitrogen	oxygen
-------	----------	----------	--------

The gas produced during photosynthesis is (1)

This is a straightforward sentence completion task, where there is a good selection of words for the candidate to select from. Again, we try and make sure the odds of getting the correct answer to this sort of question is comparable to the 1 in 4 odds seen with multiple choice questions.

Here's the other type of question:

The binomial name for polar bears is *Ursus maritimus*.
Draw two straight lines to correctly match the genus and species of the polar bear with its binomial name.

classification	binomial name
genus	<i>Ursus</i>
species	bear
	<i>maritimus</i>

(1)

Note that, in this question, there is only 1 mark available – so both lines must be correct in order for the mark to be scored (as in this example). The number of marks depend to some extent on the difficulty of the question – so a more difficult question with two boxes on the left to link to boxes on the right could be worth two marks.

Both these types of question are more likely to be found in the Foundation Tier question papers than in the Higher Tier ones; and will probably be seen more often for GCSE Science than for Additional Science and the extension units.

Open response (structured)

This sort of question asks candidates to come up with their own information in response to the question. Note that there is a wide range of command words that can be used to prompt candidates in their answer. These command words do have a hierarchy: so that the amount of information that candidates supply should increase as the command changes from 'state' to 'describe' to 'explain', for example.

These questions are worth varying numbers of marks: for Foundation Tier papers, you'll find questions worth 1, 2 or 3 marks; at Higher Tier, you may additionally find a 4-mark question of this type in the exam paper.

Note that some questions which have a total of 2 or 3 marks are essentially a group of one-mark questions put together. For example:

(b) Give two ways that plant hormones are used by professional growers.

.....

.....

.....

(2)

This question is essentially 2 one-mark questions as the two marks are completely independent recall demands.

In terms of the composition of the questions papers, about 12 – 18 marks will be for one mark questions (a mixture of closed and open responses) – towards the top of this range for Foundation Tier and towards the bottom for Higher Tier. Foundation Tier papers will contain a mixture of two-mark and three-mark questions, with more two-mark than three-mark ones. Higher Tier papers will contain a more balanced mixture of two mark and three-mark questions, with the possibility of a four-mark question in addition. Some of these questions may, of course, be calculations rather than describe / explain questions.

Here are two student answers to one-mark structured questions:

(a) Coal is a non-renewable source of energy.

(i) Give the name of another non-renewable source of energy

Oil (1)

(ii) Give the name of a renewable source of energy

Wind (1)



This first candidate has correctly selected a source of energy for both question parts.

(a) Coal is a non-renewable source of energy.

(I) Give the name of another non-renewable source of energy

~~Steam Geothermal heat from sun~~ Wood (1)

(II) Give the name of a renewable source of energy

Wood Geothermal, wind turbines (1)

This candidate has incorrectly selected “wood” as non-renewable, but has given two examples of a renewable source. In this case, the candidate will score 1 mark from the 2 available.

Here’s another example, this time a two-mark question.

Notice the change in command word – here it’s a ‘describe’ question. This implies that there should be more information presented by candidates than for the previous type of question (where the command word was ‘give’) – and indeed the mark allocation for this question is 2 marks.

(b) The Earth’s early atmosphere is thought to have contained carbon dioxide, water vapour and some other gases.

Describe how the oceans formed from this atmosphere.

The CO₂ warmed the atmosphere as it traps heat energy from the sun, this caused the water vapour to turn from gas to liquid which is water thus forming oceans. (2)

This candidate has made a correct statement about the role of carbon dioxide – although it is not relevant to the question being asked. In addition, there is an error about increasing heat energy causing a transformation from gas to liquid.

(b) The Earth’s early atmosphere is thought to have contained carbon dioxide, water vapour and some other gases.

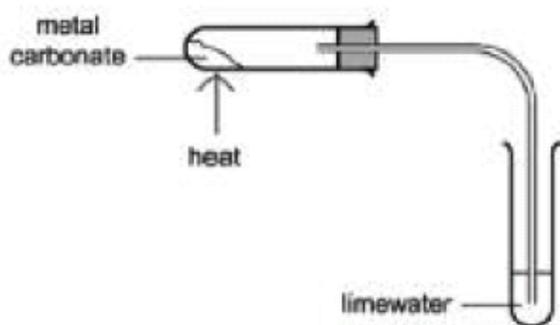
Describe how the oceans formed from this atmosphere.

As the atmosphere cooled, much of the water vapour will have condensed into water and formed the oceans. (2)

This candidate, on the other hand, has got the idea that cooling of the Earth took place and that this cooling caused the condensation of water vapour into liquid water. (Examiners would not penalise for the use of the word ‘condensated’ rather than ‘condensed’ – although it is not quite the correct word, the candidate’s meaning is clear and unambiguous).

Let's also take a look at a three-mark question:

Equal amounts of different metal carbonates were heated using the apparatus shown. The time taken for the limewater to go milky was measured.



Here are the results

substance heated	time for limewater to go milky (s)
magnesium carbonate	20
calcium carbonate	41
strontium carbonate	57
barium carbonate	did not go milky after 300s

(ii) Explain what the results of this experiment show about these metal carbonates.

.....
(3)

Here, the mark scheme is looking for a simple relating of the data to the pattern of decomposition in these metal carbonates. Checking the specification, you can see that candidates don't need to know why this pattern occurs.

(ii) Explain what the results of this experiment show about these metal carbonates.

Magnesium carbonate reacts quicker with oxygen than the rest and barium carbonate reacts with oxygen the slowest. This suggests that magnesium is the most reactive, then calcium, then strontium and then barium.
(3)

This candidate hasn't really understood the reaction happening here – thermal decomposition – but has got the idea that the carbonates decompose at different speeds. The candidate relates this to their reactivity, rather than their stability.

(ii) Explain what the results of this experiment show about these metal carbonates.

Magnesium was the least reactive carbonate of the four because it released carbon dioxide faster than the other carbonates. Barium carbonate would need strong heating to release carbon dioxide.

(3)

This candidate also uses reactivity rather than stability, but gets more of the idea that the carbonate is breaking up to release carbon dioxide.

Extended writing

This type of question is probably the most challenging on the exam paper (although they are written to be accessible to all candidates), and is worth the largest number of marks (six). There will be two questions of this type on each examination paper, and these are likely to be on Q5 and Q6.

The questions may be based on students' knowledge and understanding of the specification; they may ask questions based on their ability to evaluate data from practicals; or they may ask about applications of the science they have learnt. There will be a variety of different demands that the questions will pose, including 'describe', 'explain', 'compare', 'discuss' or 'evaluate'.

One other thing makes these questions slightly unusual is the way they are marked. You're used to the idea that, if a question is worth x marks, then students have to make x points in their answer, so you're probably thinking that you have to make six points in these 6-mark questions. However, the questions are actually marked by using three mark bands – or levels. Many of the questions are quite open – and there will be a variety of ways in which different students will write their answer. So, it's more difficult to come up with a traditional mark scheme. Instead, the mark scheme will include some key points that may be present in the answer, but then describe three typical standards of answer. The examiner will match the answer to the description given in the mark scheme and therefore place the answer in one of the levels.

The three levels are: Level 1 (1 or 2 marks), Level 2 (3 or 4 marks) and Level 3 (5 or 6 marks). So, as you can see, having placed the answer in one of the levels, there is still a decision to make about which of the two marks will be given to the answer. To some extent, this will be based on whether students have just met the criteria for that level, or whether they have included some material from the next level up. It will also be influenced by how well they communicate their answer. Part of this will be spelling and grammar, but more of it will be the correct use of technical terms and their ability to make the points in their answer in a logical and structured way.

Here's a student's answer to an extended writing question, at Higher Tier.

(b) Some biofuels are made from plants.

The biofuel ethanol is made from sugar cane or sugar beet.

Petrol is a fossil fuel that is made from crude oil.

Discuss the advantages and disadvantages of using biofuels instead of petrol for cars.

Biofuels are not as polluting as petrol and are more environmentally friendly. However, a lot of space is needed to grow the sugar cane or beet, which will lead to deforestation. We will not have to use or burn fossil fuels (oil). The carbon dioxide given out by cars will be taken in by the plants, in a cycle, so no excess CO_2 is produced.

(6)

The mark scheme for this question is as follows:

1	1-2	<ul style="list-style-type: none"> • there are a few advantages given regarding the use of biofuels compared to petrol • there are a few disadvantages given regarding the use of biofuels compared to petrol • there is little comparison of the comparative advantages and disadvantages in terms of putting forward a balanced consideration • the answer communicates ideas using simple language and uses some scientific terminology. Spelling, punctuation and grammar are used with limited accuracy
2	3-4	<ul style="list-style-type: none"> • there is a number of advantages given regarding the use of biofuels compared to petrol • there is a number of disadvantages given regarding the use of biofuels compared to petrol • there is some attempt to present a balanced consideration of the advantages and disadvantages of using biofuels and the subsequent possible environmental impacts • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately. Spelling, punctuation and grammar is used with some accuracy
3	5-6	<ul style="list-style-type: none"> • most of the identifiable advantages of using biofuels instead of petrol are given • most of the identifiable disadvantages of using biofuels instead of petrol are given • there is a balanced consideration of the advantages and disadvantages of using biofuels and the subsequent possible environmental impacts • the answer communicates ideas clearly and uses a range of scientific terminology appropriately. Spelling, punctuation and grammar is used with few error



This student's answer mentions some advantages and some disadvantages and makes some attempt to compare the two (the use of the word 'however' is key here). Although the student is right that carbon dioxide released by combustion can be taken back in by more growing plants, the key idea "carbon neutral" is missing; and there is no consideration of the other carbon dioxide released in the manufacture and transport of biofuels.

Overall, therefore, this question matches best to the Level 2 description. The answer is well presented and quite well argued, but the small number of advantages and disadvantages would probably lead to a final mark of 3 being given.





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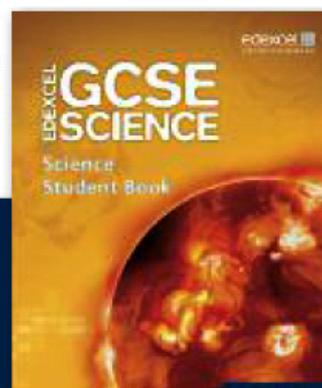
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