

GCSE

# SCIENCES

## Teacher Guide

Version 1



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# INTRODUCTION

The key aims of this document are to help teachers understand how a mark scheme is applied to exam questions, with particular focus on level of response questions. By improving the understanding of how a mark scheme is applied, teachers can better prepare candidates for the style of questions they will face in the examinations.

This document aims to;

- Highlight areas where candidates can be better trained in the process of completing exam questions
- Offer advice to teachers on how simple mistakes can be avoided to gain the maximum score for closed response and level of response style questions
- Provide an insight into the marking of level of response style questions including commentaries on how the mark scheme has been applied by examiners
- Allow the opportunity for teacher to test themselves on the marking of level of response style questions.

## Command words

Candidates should experience training in the vocabulary used in an examination. This will help students to approach the questions that are set in a more confident manner. By understanding the command words the examiner uses, the candidate is ensuring they do what they have been asked to do to be awarded marks. For example describe and explain are two very different command words.

**Describe** – the candidate will be required to say what they see from a graph/diagram/experiment/table etc.

**Explain** – The candidate will be required to make a link between statements/say why a phenomenon occurs/say how phenomenon are linked etc. These style of questions need more than just a simple statement to be made and are often 2 or more marks.

**Compare** – To answer this style of question correctly often needs an 'er' word such as greater, higher, lower, longer, shorter, slower, faster, further, closer, brighter, dimmer, bigger, smaller, quieter, noisier, etc. These are a good starting point to begin constructing responses. There are obvious exceptions that do not work here such as more and less reactive.

## Closed response questions

These are often perceived as the 'easy' tick box style questions. This is simply not the case. Whilst there is a small chance that candidates can 'guess' the correct answer, multiple choice questions are very carefully constructed and can be effectively

used to assess student understanding in the same way that student progress might be assessed during a lesson through 'hinge' questions.

## Tick boxes/circling correct answers

These can range from recall of facts from the specification to application of knowledge questions. The more challenging style of question can ask students to read information, make decisions about the information and apply their knowledge in a variety of ways.

Common errors in this style of question include;

- Identifying the wrong number of responses needed – ticking more boxes than is required shows uncertainty in the response and so will lose marks. This might also include ticking too few boxes eg where 2 ticks are needed for 1 mark
- Identifying statements that are factually correct statements but they don't answer the question that has been posed. Such statements are deliberate distractors used to differentiate the knowledge the student has as well as how well they apply their knowledge in that particular situation
- Changing the answer. Whilst examiners make every effort to award marks for correct science, this is sometimes made difficult by the changing of responses. If students want to change a response they need to make it clear to the examiner which answer they would like marking. eg crossing out of ticks needs to be done in such a way that it is clear which tick is their final response. This also applies to circling of answers and joining of boxes using lines.

## Connecting boxes

There is a temptation for students to connect boxes up even when they are not required to do so. Students need to read the instructions carefully to decide how many boxes need to be connected. As with tick box style questions, students will lose marks for drawing too many lines to connect boxes or too many lines leaving, or joining a single box as this again shows doubt in the students understanding.

## Calculations

Students should always be encouraged to show their workings for all calculations they are asked to carry out. Where more than one mark is awarded for the calculation it is possible to gain credit for the correct working.

Students often press the wrong buttons on their calculator when carrying out calculations. When the working is shown but the wrong buttons pressed then credit can be given for the correct process rather than just the expected numerical value.

Where calculation questions follow on from each other but the student does not know how to answer the first part but feels able to answer the second part, they should use any value of their choice as a response to the first part to enable them to gain 'error carried forward' marks for the second process in the sequence.

### Level of response style questions (6 marks)

These questions are marked very differently to other questions on an exam paper. In this case the response is read as a whole and the ideas within it are assessed against a 3 level structure. A response which meets the criteria set out by the command words and has clear science content will score a level 3. A 'level 2' response will have some science content and may not address all aspects of the command words in the question. These questions are not marked using a tick system. The quality of written communication is also judged in this style of question.

When reading the mark scheme for such questions it is important to remember that the left hand side gives you the expected actions for the command words and what are the expected ideas needed to achieve a particular level, whereas the right hand side contains statements that are indicative science content. The list is not a complete list and credit may be awarded for a response that includes statements not in the indicative science content section.

It should be noted that writing more does not score more marks and that the quality of the answer is judged rather than the number of points made. If an essential point is missed then the response may be deemed to be a lower level.

Examples of where levels are not achieved might include;

- Giving only advantages when both disadvantages are also required from the command words (or vice versa)
- Only describing instead of explaining a phenomenon when an explanation is required from the command words
- Making unrelated statements rather than linking ideas together in a response.

## Exemplar materials

This section contains actual examples of student responses from previous series of examinations and the judgements made by lead/senior examiners in the form of commentaries.

### A171-01 January 2013 (Chemistry based question)

Level 1 response

**Describe and explain the advantages and disadvantages of adding chlorine to water supplies.**

*The quality of written communication will be assessed in your answer.*

The advantages of adding chlorine to water is it kills off any germs and bacteria found in the water and also helps to keep teeth white. A disadvantage to this is it can be expensive and also if the right amount of chlorine isn't added it can make people ill and can kill.

[6]

This response gives only advantages of adding chlorine. There is enough indicative content for 2 marks. 'Kills off bacteria' is well expressed (2 marks) but 'gets rid of bacteria' would be limited by QWC (1 mark) as this is not clear what is happening to the bacteria.

Level 2 response

**Describe and explain the advantages and disadvantages of adding chlorine to water supplies.**

*The quality of written communication will be assessed in your answer.*

An advantage of adding chlorine to water supplies is that through the chlorination process, the chlorine kills bacteria in the water, this can stop the disease cholera spreading. A disadvantage is that the chlorine can react with other chemicals in the water to make toxins. This is poisonous to us and can have harmful effects.

[6]

This response gives reasonable detail when discussing the advantages of adding chlorine. The candidate has also attempted to discuss disadvantages but 'other chemicals in the water' is not enough to gain credit, although 'make toxins' implies the product of such a reaction would be toxic. This is clearly expressed and so 4 marks are awarded. There is not enough detail or explanation given for the disadvantages of adding chlorine for this to be a level 3 response.

Level 3 response

**Describe and explain the advantages and disadvantages of adding chlorine to water supplies.**

*The quality of written communication will be assessed in your answer.*

The Advantages of using chlorine in water is that it kills all disease-causing micro-organisms, prevents fungi from developing, gets rid of nasty smells and prevents the water from developing a colour, however chlorine has disadvantages like causing organic compounds in the water to turn into chlorinated hydrocarbons which is carcinogenic (cancer-causing), also breathing chlorine in can irritate lungs, this can happen when taking shower and steam is breathed in, and chlorine as liquid can seriously irritate the eyes.

[6]

This response has clearly described and explained the advantages and disadvantages of adding chlorine to water. It contains all aspects required from a level 3 response. This scores 6 marks.

## A171-01 January 2013 – Mark scheme

A171/01

Mark Scheme

January 2013

Question	Answer	Marks	Guidance
6 (a)	<p><b>Level 3 (5–6 marks)</b> Answer gives full details of both advantage and disadvantage. Quality of written communication does not impede communication of the science at this level.</p> <p><b>Level 2 (3–4 marks)</b> Answer gives some details of both advantage and disadvantage, or one in full detail. Quality of written communication partially impedes communication of the science at this level.</p> <p><b>Level 1 (1–2 marks)</b> Answer relates only to advantage or disadvantage in limited detail, not both. Quality of written communication impedes communication of the science at this level.</p> <p><b>Level 0 (0 marks)</b> Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p><b>This question is targeted at grades up to E</b></p> <p><b>Indicative scientific points may include:</b></p> <p><b>Advantages;</b></p> <ul style="list-style-type: none"> <li>• chlorine kills bacteria</li> <li>• bacteria can cause disease</li> <li>• disease can be spread in water supply</li> <li>• example of water-borne disease eg cholera</li> </ul> <p><b>Disadvantages;</b></p> <ul style="list-style-type: none"> <li>• chlorine reacts with organic materials in water</li> <li>• product is toxic/carcinogen</li> <li>• products of this reaction can affect health</li> </ul> <p>Ignore taste/colour/smell of water</p> <p><b>Use the L1, L2, L3 annotations in Scoris: do not use ticks</b></p>

**A153-02 June 2013 (Physics based question)**

Level 1 response

**Explain how food is sterilised by radiation. Include safety aspects.***The quality of written communication will be assessed in your answer.*

The food is exposed to beta ( $\beta$ ) particles, which destroy the bacteria from the food, both inside and out? One of the safety issues with using radiation to sterilise food is that the food may now contain radioactive particles, which could contaminate someone if the product is ingested.

[6]

This response scores only 1 mark. They have given an explanation of a procedure. 'Destroy the bacteria' is just equivalent to kill bacteria. This is a very basic response as it gives no mention of the actual procedure – eg using gamma rays/radiation. It does not give any safety aspects either. In this case 'beta' is ignored.

Level 2 response

**Explain how food is sterilised by radiation. Include safety aspects.***The quality of written communication will be assessed in your answer.*

The food is sterilised when it is exposed to a large amount of radiation, it goes through a scanner which kills off all the microbes from the food meaning it is fresher and doesn't have to be frozen. People who work in a processing centre place the fruit on the scanner wearing protective clothing, they also come out of the room before exposing a large amount of radiation. They wear protective gloves to ensure that they are not contaminated, just irradiated.

[6]

This response has an explanation and a safety aspect but no procedure. They have not said that gamma rays are used but they have explained that it kills off all the microbes. A safety feature of protective clothing has been given. This is a level 2 response but is weakened as it has not given a procedure. It scores 3 marks.

Level 3 response

**Explain how food is sterilised by radiation. Include safety aspects.***The quality of written communication will be assessed in your answer.*

When food is sterilised by radiation, gamma rays are fired at the food. These rays kill all the microbes in the food, allowing it to be fresher for longer. Gamma rays are only stopped by very thick lead or other thick metals, which means they will penetrate through the food and not stay in it, causing damage to the people who eat it. This is all done in a secure machine, so it will not harm the people working at the processing centre.

[6]

This response has identified the procedure of using gamma rays. It has explained this by describing the killing of microbes and the penetration through the food. It has a safety aspect of using a 'secure machine' but this is weak. This is a level 3 response but scores only 5 marks due to the poor safety description. A better description of safety would have given 6 marks.

## A153/02 June 2013 – Mark scheme

A153/02

Mark Scheme

June 2013

Question	Answer	Marks	Guidance
1	<p><b>Level 3 (5–6 marks)</b> Identifies procedures linked to correct explanation AND safety aspect Quality of written communication does not impede communication of the science at this level.</p> <p><b>Level 2 (3–4 marks)</b> Identifies procedures OR Identifies a procedure with linked to correct explanation OR Identifies a procedure and safety aspect.</p> <p>Quality of written communication partly impedes communication of the science at this level.</p> <p><b>Level 1 (1–2 marks)</b> Identifies a procedure OR safety aspect. Quality of written communication impedes communication of the science at this level.</p> <p><b>Level 0 (0 marks)</b> Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p><b>This question is targeted at grades up to B</b></p> <p><b>Indicative Science points may include:</b></p> <p><b>Procedure &amp; explanation</b></p> <ul style="list-style-type: none"> <li>• <b>use ionising radiation (gamma/X-Ray)</b> – Idea that radiation is able to penetrate fruit and packaging</li> <li>• <b>use ionising radiation (gamma/X-Ray)</b> – ionising radiation kills microorganisms</li> <li>• <b>wrap food in airtight material</b> – prevent microorganisms getting in after sterilisation</li> <li>• <b>leave close to radioactive material</b> – to give microorganisms a high dose</li> <li>• <b>long exposure time</b> – to give microorganisms a high dose.</li> </ul> <p>Ignore references to alpha and beta Ignore get rid of/remove bacteria</p> <p><b>Safety Aspects</b></p> <ul style="list-style-type: none"> <li>• shielding/protective clothing</li> <li>• workers don't go near source</li> <li>• workers wear monitoring badges/check ups</li> <li>• workers exposure to radiation is limited to permitted levels.</li> </ul> <p>Ignore safety goggles/masks Ignore safety aspects linked to consumers</p>

**A153/02 June 2013 (Biology based question)**

Level 1 response

**Describe the features and mechanisms in the brain that allow it to adapt so that Jenny can learn to speak again.**

*The quality of written communication will be assessed in your answer.*

Jenny is able to learn to speak again by listening to her surroundings. The repetition of words would create lines in her brain and as she hears the words over again the lines begin to thicken enabling her to be able to speak again.

[6]

This response has the idea of repetition only. The rest of the response has no credit worthy science. This scores 2 marks as the idea is clearly expressed.

Level 2 response

**Describe the features and mechanisms in the brain that allow it to adapt so that Jenny can learn to speak again.**

*The quality of written communication will be assessed in your answer.*

For Jenny to be able to speak again she will have to strengthen her pathways again. And for this to happen people will need to always speak around her as repetition will also make new pathways to help her be able to speak. Another thing she can do is develop a conditioned reflex.

[6]

This a level 2 response as the candidate has given an incomplete description of 2 mechanisms rather than identifying a feature and a mechanism. This is a best fit model so it is awarded level 2. The idea of new pathways and repetition are clear, but the idea that the pathways are strengthened by repetition is not explicit. This scores 3 marks.

Level 3 response

**Describe the features and mechanisms in the brain that allow it to adapt so that Jenny can learn to speak again.**

*The quality of written communication will be assessed in your answer.*

There are billions of possible neuron pathways that could be taken. In order for Jenny to learn to speak again she will have to transmit impulses along new pathways in the cerebral cortex that control her speech. By continually practising with her speech therapist she is strengthening those pathways, this makes them easier to follow and therefore speak. The part of the cerebral cortex that controls memory is also a key factor. By using the action of storage and retrieval she won't forget how she learned to speak previously.

[6]

This response has a very clear description of features and mechanisms. They have identified the large number of neurones in the brain and that the cerebral cortex is responsible for speech. The mechanisms have been clearly stated as new pathways are formed and that these are strengthened through repetition. This scores 6 marks.

## A153/02 June 2013 – Mark scheme

A153/02

Mark Scheme

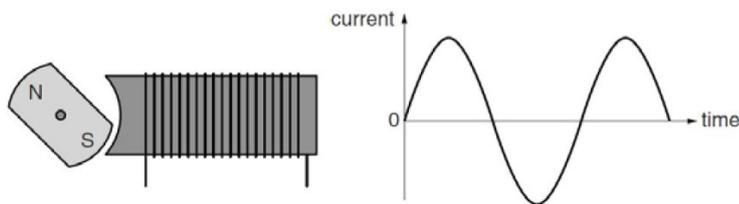
June 2013

Question	Answer	Marks	Guidance
8 (a)	<p><b>Level 3 (5–6 marks)</b> Identification of some features and detailed description of mechanisms to include neurons. Quality of written communication does not impede communication of the science at this level.</p> <p><b>Level 2 (3–4 marks)</b> Identification of a feature and an incomplete description of a mechanism. Quality of written communication partially impedes communication of the science at this level.</p> <p><b>Level 1 (1–2 marks)</b> Identifies a feature OR a statement about the mechanism. Quality of written communication impedes communication of the science at this level.</p> <p><b>Level 0 (0 marks)</b> Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p><b>This question is targeted at grades up to A*</b></p> <p><b>Relevant points include:</b></p> <p><b>Mechanisms:</b></p> <ul style="list-style-type: none"> <li>• learning involves new neuron pathways forming</li> <li>• repetition will strengthen new pathways</li> <li>• repetition means new pathways are more likely to transmit</li> <li>• damaged area bypassed</li> <li>• brain neurons do not regenerate</li> </ul> <p><b>Features:</b></p> <ul style="list-style-type: none"> <li>• cerebral cortex identified as part of the brain affected by stroke</li> <li>• cerebral cortex is part of brain concerned with language/communication/speech</li> <li>• neurons in brain</li> <li>• billions of neurons gives capacity to learn</li> <li>• large number of neurons gives capacity to learn</li> </ul> <p>ignore reference to the damaged site repairing</p>

### A152-02 June 13 (Additional Science A based question)

Level 1 response

Here is a generator of alternating current. Explain the shape of the graph. You may add labels to the diagram.



*The quality of written communication will be assessed in your answer.*

The graph shows the current and the time starting at 0. Also magnet spins near some coiled wires These show how it can all change.

[6]

This candidate has mentioned that the magnet must rotate near the coil (so could be level 2), but there is no overt causal link between current and changes of the magnet, so fits better with level 1. So one mark.

Level 2 response

Here is a generator of alternating current. Explain the shape of the graph. You may add labels to the diagram.

*The quality of written communication will be assessed in your answer.*

As the magnet does a half-turn the current increases then decreases. When the other side of the magnet is near the coil the current on the scale heads down and then back up once the magnet has completed it's half-turn.

[6]

Candidate has identified the magnet and the coil and has attempted to explain the current in terms of the rotation of the magnet – so level 2. However, there is no mention of changing poles, magnetic field etc – only three marks.

Level 3 response

**Here is a generator of alternating current. Explain the shape of the graph. You may add labels to the diagram.**

*The quality of written communication will be assessed in your answer.*

The shape of the graph represents the rotating movement the magnet is doing. At the first high peak in current on the graph it shows the south side of the magnet has rotated past the coil. This will increase the current (shown on the graph). At the lowest peak it shows that the magnet is now vertical meaning neither the north or south side of the magnet is close to the coil. This will decrease the current which is represented by the dip in current on the graph. The next high peak shows that the north side of the magnet is now next to the coil which will increase the current shown on the graph.

[6]

The candidate correctly explains the alternating nature of the current in terms of the changing poles of the magnet at the end of the coil. The rotation of the magnet is mentioned as well, so best fit is to level 3. (Explanations in terms of changing poles are as acceptable as those in terms of changing magnetism or magnetic field). However, the lack of identification of the core suggest a mark of 5.

### A152/02 June 2013 – Mark scheme

A152/02

Mark Scheme

June 2013

Question	Answer	Marks	Guidance
4	<p><b>Level 3 (5–6 marks)</b> The candidate identifies both properties and explains them in terms of the structure/bonding of graphite. Quality of written communication does not impede communication of the science at this level.</p> <p><b>Level 2 (3–4 marks)</b> Candidate identifies either of the properties and explains it in terms of the structure/bonding of graphite. Quality of written communication partly impedes communication of the science at this level.</p> <p><b>Level 1 (1–2 marks)</b> Candidate either identifies one of the properties or describes the structure/bonding of graphite. Quality of written communication impedes communication of the science at this level.</p> <p><b>Level 0 (0 marks)</b> Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p><b>This question is targeted at grades up to A.</b></p> <p><b>Relevant points include</b></p> <p><b>electrical conductivity</b></p> <ul style="list-style-type: none"> <li>high conductivity/conductor of electricity</li> <li>because               <ul style="list-style-type: none"> <li>(only) three bonds for each atom</li> <li>(some) electrons free to move</li> </ul> </li> </ul> <p><b>melting point</b></p> <ul style="list-style-type: none"> <li>high (above 800°C)</li> <li>because               <ul style="list-style-type: none"> <li>giant structure</li> <li>strong bonding</li> <li>covalent bonds</li> <li>difficult to separate/lot of energy needed</li> </ul> </li> </ul> <p><b>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</b></p>

### A152-02 June 2013 (Additional Science A based question)

Level 0 response

**Dutch elm disease has killed many elm trees in England. Some elms are resistant to the disease. Park keepers want to plant resistant elm trees to replace one that have been killed. They decide to use cuttings from the resistant elms, rather than using seeds. Describe the process of using cuttings, and explain why they choose this method.**

*The quality of written communication will be assessed in your answer.*

They use cutting as its easy. Also it will be the same as the original, it also will have the same as they they will have the same nucleus. Also they will grow quicker too.

[6]

There is no description of how to grow cuttings, nor is there any science in the justification. They will have the same what? Number of leaves, initials carved into their trunk, final height? No marks.

Level 1 response

**Dutch elm disease has killed many elm trees in England. Some elms are resistant to the disease. Park keepers want to plant resistant elm trees to replace one that have been killed. They decide to use cuttings from the resistant elms, rather than using seeds. Describe the process of using cuttings, and explain why they choose this method.**

*The quality of written communication will be assessed in your answer.*

Cuttings are taken from the shoot of a tip as it contains unspecialised cells that divide mitotically. Cuttings are clones and are identical to the parent cell and contain the same genes. Also unspecialised cells may develop into any type of cell. Additionally, auxins are used to increase the production of it's growth.

[6]

The candidate has provided a small bit of information about how to take cuttings, but this is more than just one omission from a practical procedure, suggesting it is below level 2. The description is very brief indeed. They have said that cuttings are clones with the same genes as the parent tree, so could be level 1. However, there is no mention of inherited resistance. So the justification is incomplete, suggesting a mark of 1.

Level 2 response

**Dutch elm disease has killed many elm trees in England. Some elms are resistant to the disease. Park keepers want to plant resistant elm trees to replace one that have been killed. They decide to use cuttings from the resistant elms, rather than using seeds. Describe the process of using cuttings, and explain why they choose this method.**

*The quality of written communication will be assessed in your answer.*

Chosing the method of cutting is better because you have to cut a bit of the stem and the side of the leaf then you have to plant it in soil. It won't grow if it only has water and light. Rooting powder needs to be adding (Plant hormones). This helps it grow faster and exactly like the plant it was cloned from. This method save a lot of time and money.

[6]

This candidate has fully described a procedure which would work. Although the justification is very shallow (no mentions of genes or inherited resistance), the best fit is level 2. So deserves four marks.

Level 3 response

**Dutch elm disease has killed many elm trees in England. Some elms are resistant to the disease. Park keepers want to plant resistant elm trees to replace one that have been killed. They decide to use cuttings from the resistant elms, rather than using seeds. Describe the process of using cuttings, and explain why they choose this method.**

*The quality of written communication will be assessed in your answer.*

A cutting is taken from the shoot of a plant so that it is a meristem, containing unspecialised cells to allow it to grow. This cutting is planted in the ground usually with a rooting hormone to help roots grow to get water for photosynthesis. The plant then grows into a clone of the original as it has the same DNA. This is good and better than seeds because it means you can get a plant (tree) with the properties you want, in this case resistant to Dutch elm disease, to help improve survival.

[6]

The described procedure would work in practice, so at least level 2. However the justification contains lots of good science and is complete, so level 3. Six marks.

This question is also on the Foundation paper, so it is to be expected that the majority of our candidates will earn at least half marks, and quite a few should get to level 3.

## A152/02 June 2013 – Mark scheme

A152/02

Mark Scheme

June 2013

Question	Answer	Marks	Guidance
11	<p><b>Level 3 (5–6 marks)</b> Describes a cutting method which would work. Either justifies use of cuttings or not use of seeds. Quality of written communication does not impede communication of the science at this level.</p> <p><b>Level 2 (3–4 marks)</b> Describes a practical cutting method with a significant error or omission. Either justifies use of cuttings or not use of seeds. Could be just a description of a cutting method which would work. Quality of written communication partially impedes communication of the science at this level.</p> <p><b>Level 1 (1–2 marks)</b> Either brief description of cutting method or justifies use of cuttings or justifies not use of seeds. Quality of written communication impedes communication of the science at this level.</p> <p><b>Level 0 (0 marks)</b> Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p><b>This question is targeted at grades up to C</b></p> <p><b>Relevant points may include:</b></p> <p><b>method</b></p> <ul style="list-style-type: none"> <li>• cut off (small) shoot/branch</li> <li>• dip in (hormone) powder</li> <li>• place in soil/compost</li> <li>• water regularly</li> <li>• until roots develop/leaves grow</li> </ul> <p><b>justification</b></p> <ul style="list-style-type: none"> <li>• (mature) plants are clones with inherited resistance</li> <li>• because they have same genes/DNA as parent tree</li> <li>• seeds formed by meiosis/sexual reproduction</li> <li>• not all seeds will have resistance</li> <li>• as they have genes from two trees</li> </ul> <p>ignore argument based on the relative speed of each method ignore discussions about meristems, unspecialised cells ... ignore argument based on cost</p> <p><b>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</b></p>



**Describe the processes that affect the amount of carbon dioxide in the air when wood burns and when trees grow.**

**Explain whether you think Sue is correct or not.**

*The quality of written communication will be assessed in your answer.*

When the trees grow, they produce their own food by photosynthesis, this takes in carbon dioxide and releases oxygen. When the trees are burning they release carbon dioxide but use oxygen to burn, so I think that Sue is correct on her statement.

[6]

**Describe the processes that affect the amount of carbon dioxide in the air when wood burns and when trees grow.**

**Explain whether you think Sue is correct or not.**

*The quality of written communication will be assessed in your answer.*

I think Sue is incorrect. When burning wood it produces carbon dioxide which will cause the level in the air to rise. When trees grow it causes oxygen. So when cutting down trees it is lowering the oxygen level.

[6]

**Describe the processes that affect the amount of carbon dioxide in the air when wood burns and when trees grow.**

**Explain whether you think Sue is correct or not.**

*The quality of written communication will be assessed in your answer.*

Sue is wrong because when we have cut down the trees and burnt them harmful gases such as carbon dioxide are made and are released into the atmosphere. This means that there will be more CO<sup>2</sup>. Also trees are needed for photosynthesis. photosynthesis converts carbon dioxide into oxygen. If there are less trees they won't be able to photosynthesis.

[6]

## A171/01 June 2012 – Mark scheme

A171/01

Mark Scheme

June 2012

Question	Answer	Marks	Guidance
1	<p>(b)</p> <p><b>Level 3 (5–6 marks)</b> Answer gives a full explanation of balance between carbon dioxide absorption and release and hence why Sue is correct. Quality of written communication does not impede communication of the science at this level.</p> <p><b>Level 2 (3–4 marks)</b> Answer gives some ideas of combustion and photosynthesis. Candidate attempts an explanation of the balance between absorption and release of carbon dioxide. Conclusion about Sue's statement may or may not be correct. Quality of written communication partly impedes communication of the science at this level.</p> <p><b>Level 1 (1–2 marks)</b> Answer gives some ideas of combustion or photosynthesis. Quality of written communication impedes communication of the science at this level.</p> <p><b>Level 0 (0 marks)</b> Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p><b>This question is targeted at grades up to C</b></p> <p><b>Indicative scientific points may include:</b></p> <ul style="list-style-type: none"> <li>• wood contains carbon compounds</li> <li>• when wood burns carbon makes carbon dioxide</li> <li>• when trees grow they take in carbon dioxide for photosynthesis</li> <li>• photosynthesis makes sugar/glucose/carbon compounds</li> <li>• trees use sugar/glucose to make other carbon compounds</li> <li>• trees also respire and produce carbon dioxide</li> <li>• burning wood returns carbon dioxide to the air that was removed from the air as the tree grew</li> <li>• there is no net change of carbon dioxide in the air (carbon neutral) so Sue is correct.</li> </ul> <p><b>Use the L1, L2, L3 annotations in Scoris; do not use ticks.</b></p>

## Answers for exercise

### Level 3 for 5 marks

**Describe the processes that affect the amount of carbon dioxide in the air when wood burns and when trees grow.**

**Explain whether you think Sue is correct or not.**

*The quality of written communication will be assessed in your answer.*

When the trees grow, they produce their own food by photosynthesis, this takes in carbon dioxide and releases oxygen. When the trees are burning they release carbon dioxide but use oxygen to burn, so I think that Sue is correct on her statement.

[6]

This response has a good description of photosynthesis and a clear description of combustion. The candidate has identified that Sue is correct but there is little discussion about the balance between the 2 processes so a mark of 5/6 has been awarded.

### Level 1 for 2 marks

**Describe the processes that affect the amount of carbon dioxide in the air when wood burns and when trees grow.**

**Explain whether you think Sue is correct or not.**

*The quality of written communication will be assessed in your answer.*

I think Sue is incorrect. When burning wood it produces carbon dioxide which will cause the level in the air to rise. When trees grow it causes oxygen. So when cutting down trees it is lowering the oxygen level.

[6]

This response has a clear discussion of combustion and so scores 2 marks. The candidate has attempted to make a comment about photosynthesis but there is not enough here to gain credit in the statement 'when trees grow it causes oxygen'. A sensible comment about photosynthesis would raise this response to level 2.

### Q1b - Level 2 for 4 marks

**Describe the processes that affect the amount of carbon dioxide in the air when wood burns and when trees grow.**

**Explain whether you think Sue is correct or not.**

*The quality of written communication will be assessed in your answer.*

Sue is wrong because when we have cut down the trees and burnt them harmful gases such as carbon dioxide are made and are released into the atmosphere. This means that there will be more CO<sup>2</sup>. Also trees are needed for photosynthesis. photosynthesis converts carbon dioxide into oxygen. If there are less trees they won't be able to photosynthesis

[6]

In this response the processes of combustion and photosynthesis have been discussed and are relatively clear. There is no discussion of the balance in the processes and the decision has been made that 'Sue is wrong' and the lack of discussion limits this response to level 2.



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