

## Tackling longer written answers in GCSE Science

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### Rationale

When the new syllabus was introduced in 2016, one major change was an increase in exam questions requiring longer written answers, some being worth six marks. This was partly to retain the skills in scientific literature that were previously embedded in the coursework element of the GCSE. As Science is now assessed entirely on the final exam series, these skills are now assessed within exam papers. The six mark questions sometimes focus on 'required practicals' (experiments all students should be familiar with from the classroom), but also sometimes on explanations of key scientific concepts or analysis of given data.

Many of our students lack the literacy skills to do full justice to their level of understanding when it comes to these questions. As a department, we decided we needed to embed the necessary skills right from KS3 and to get our students used to the idea of regularly writing these longer style answers as independently as possible.



### The idea

This year I decided to try out various differentiated scaffolding techniques to help students at all levels of attainment to score marks on these sorts of questions in exams. With the lowest achievers, it is simply giving them the confidence to write something they know about the question in order to stand a chance of scoring at least something rather than leaving the answer space blank. With the highest achieving students, it is more about giving them the familiarity to know what content is likely to be required, and the tools and experience to construct an answer with the clarity and detail required for the highest marks. And of course, there are all the others in between!

### The plan

The format I used for this study was to give different groups of students a range of six mark questions taken from past exam papers. I provided the question and used a brief class discussion to ensure all students understood what the question was asking and to start to share some ideas about what might be included. They then worked under test conditions for 6 minutes (a science exam is 90 marks and 90 minutes) to construct their answers independently, though with the differentiated scaffolding using the Bronze, Silver Gold system. I then marked their answers, providing individual feedback on what they needed to add in order to improve their answer. They subsequently used this feedback, along with class discussion, and in some cases mark scheme content, to redraft or improve their work.

### Example 1

This question concerned the immune response to pathogens, and the different types of white blood cells involved. This is a big part of this unit of study, and so is quite an open-ended question. There is a lot that students could include in an answer to this question, but I knew they would find it difficult to know where to start.

(a) Describe how pathogens cause infections and describe how white blood cells defend the body against these pathogens.







In this question you will be assessed on using good English, organising information clearly and using specialist terms where appropriate.



What should you include in an answer to this question?

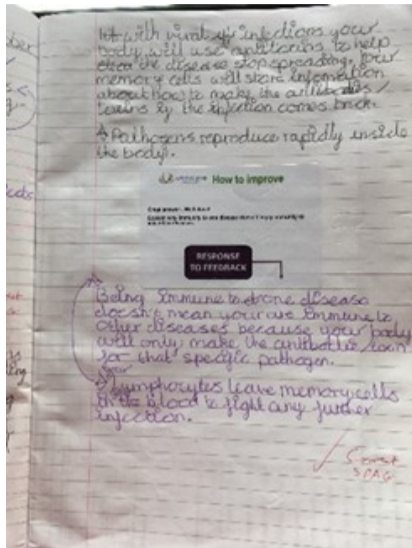
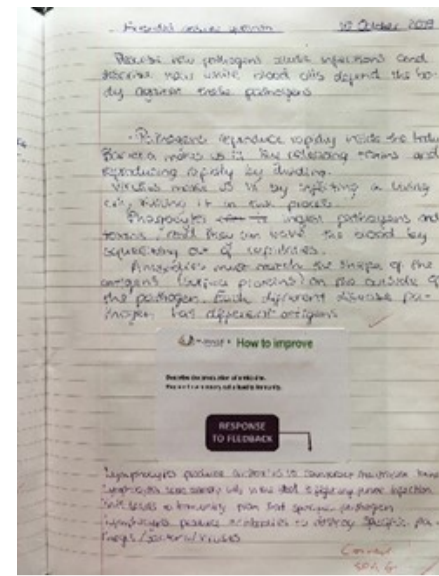
Describe how pathogens cause infections and describe how white blood cells defend the body against these pathogens.

#### Success criteria

	Describe how pathogens reproduce in the body	(4-5)
	Describe how bacteria make us ill.	(4-5)
	Describe how viruses make us ill.	(5-6)
	Describe what phagocytes do.	(5-6)
	Describe the production of antibodies.	(6-7+)
	Describe the production of antitoxins.	(6-7+)
	Explain how memory cells lead to immunity.	

Therefore, my scaffolding took the form of differentiated success criteria matched to the mark scheme, in order to break down the question and to allow lower achieving students to attempt the easier marks first. The approximate grades corresponding to each part of the question helped students to pitch their level based on their target grade.

The written responses were encouraging. Almost all students attempted to construct written answers like the one shown here. While not many of them scored high marks, they were getting used to the idea that this is what is required in an exam. The feedback stickers helped to give them specific things to add to improve their answer, which then gave them a relatively complete exemplar answer to use in their revision.

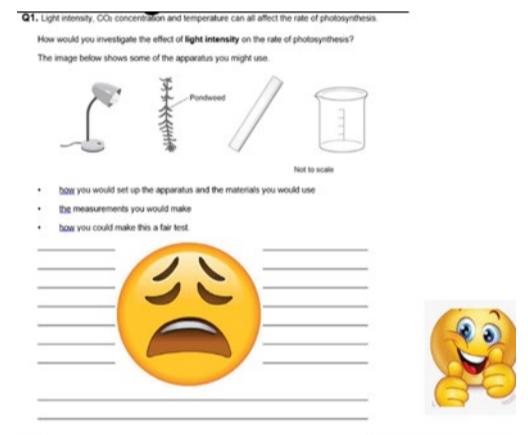


This answer was of higher quality, and I felt that I was doing a disservice to students working at this level by providing too much scaffolding. Meanwhile there were others working at a lower level who were barely able to begin on the task even with the success criteria broken down.

I needed to differentiate my scaffolding more with personalised support for different students based on their attainment level.

### Example 2

This question is one about a required practical on photosynthesis. Students are expected to be familiar with this technique for measuring the rate of photosynthesis, considering variables, analysing results and evaluating the method used. As I had found (not unexpectedly) from example 1 most students found it very challenging to tackle these long answer questions, so I spent time explaining how they should frame them in an exam situation. Many felt overwhelmed by the large answer space and the high demand suggested by the 6 marks (6 marks, I can't do that - despair). Instead I encouraged them to see these questions as opportunities to get at least some potentially easy marks that others might not even try for (6 marks up for grabs - thumbs up).



I developed more differentiated support for students with three levels of scaffolding:

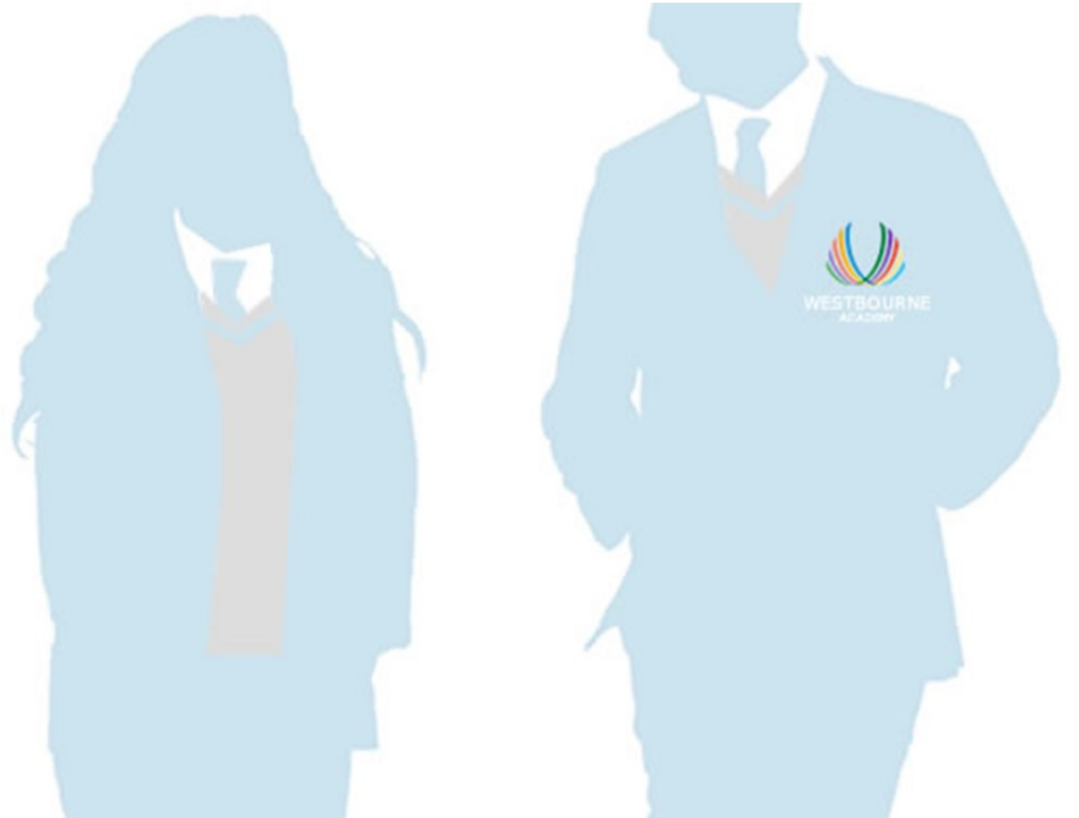
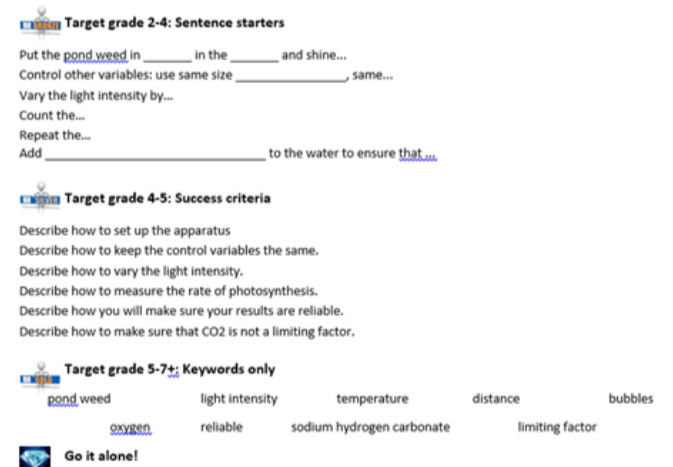
**Bronze (target grade 2-4)** - Sentence starters to provide structure and a starting point, allowing students to draw on their knowledge and understanding as far as possible.

**Silver (target grade 4-5)** - Success criteria broken down so that students could tackle different elements of the question one at a time but still practice constructing sentences independently.

**Gold (target grade 5-7+)** - Key words to act as reminders of the correct terminology and some of the content that should be included.

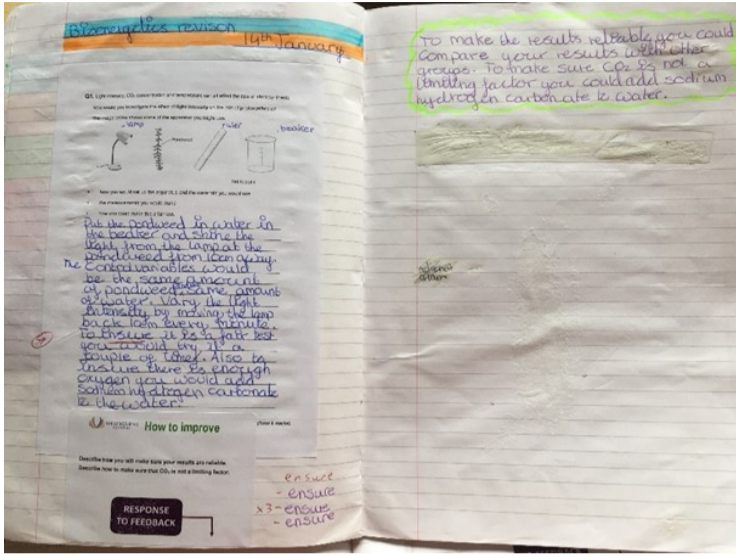
The diamond challenge was to 'go it alone' with no scaffolding as if they were in an exam hall. As I have done more of these lessons I have encouraged more and more of the (especially higher achieving) members of some groups to challenge themselves to do this.

I cut these 'help sheets' into separate target graded slips and experimented with different ways of providing them to students in different groups. Sometimes I put them on their desks prescriptively before the lesson, sometimes I provided them on a group of tables and gave them more choice over which level to tackle, checking that they were at choosing at least close to, on or above their target grade. Generally students were conscientious in using the help sheet appropriate to their target grade and I had some interesting conversations with those who chose below (or

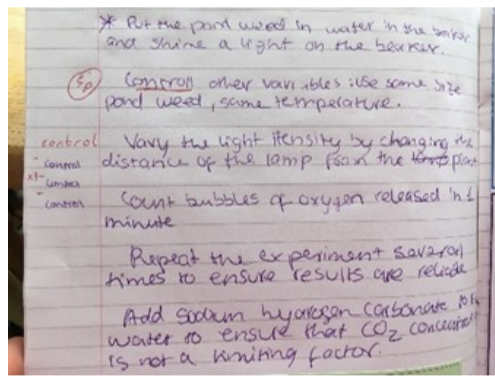
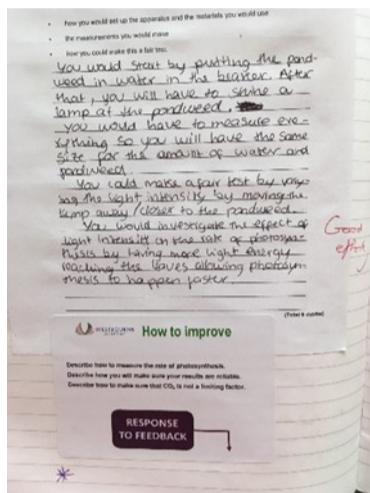




above) their target. In most cases, I found that constructive dialogue and encouragement over time as they did more of these lessons was more effective than being more prescriptive. I did need to be more prescriptive with some students who were looking for the easy way out every time.



These help sheets certainly resulted in students at all levels making more progress as the lower achieving were able to complete the task more effectively and produce a good exemplar answer, while the higher achieving had to work more independently as they would have to do in an exam.



When it came to improving their answers following feedback, I tried using the redrafting approach often used in English lessons. I felt that students did not get much out of this as it meant repeating much of what they had already said, and looking to the mark scheme for the 'perfect' answer, rather than focusing on the key content they had missed and how to articulate it themselves. Instead, they added the missing or incorrect content in purple pen.

## Student perceptions

Lower achieving pupils really liked the sentence starters, but of course they will have to tackle these questions on their own in real exams so I would need to build in some form of transition challenge in year 11.

Students with high target grades who lacked confidence in the subject tended to choose more support, unsurprisingly. I tried to encourage them to use less support each time, but this is clearly an issue, as these students need to be pushed to write more independently in Science.

Most students still do not enjoy answering these questions in class. It is a challenging exercise.

Many commented that they feel more confident tackling these questions, and more willing to give them a go in exams.

Most students liked the differentiated help sheets, and felt they provided the right level of discretion on their part to challenge themselves at an appropriate level.

With the school closure I was unable to carry out a more formal survey of pupil response to these activities, so this would be the next step for me next academic year.

## Key findings:

*Performance on these questions improved over time as students become more familiar with the process, and less daunted by the magnitude of a six-mark question.*

*Higher achieving pupils still had difficulties constructing clear answers independently so underlying literacy skills need to be addressed.*

*Some of the lowest achieving pupils copied out unfinished sentence starters, which essentially achieved nothing. In subsequent lessons I focused on these students ensuring I supported them to finish each sentence as far as possible in their own words before moving on to the next.*

*The process has flagged up the importance of the underlying literacy skills required for these long answer questions. More work is required to help students at all levels develop these skills. Embedding this type of activity in lessons throughout KS3 and KS4 should lead to further improvements.*

*Again, with the school closure, it has been difficult to document more of these interventions as I need more opportunity to experiment with some of the differentiated support.*

