

Modelling literacy teaching episodes

How to write good answers to 6 mark questions.

Activity	Who	Time (minutes)
Learning objective and outcomes.	Teacher	2
Tune in: <ul style="list-style-type: none"> Pupils circle all the useful words and phrases in the example question that give clues about what you should include in your answer. 	Pupils	3
Reinforce: <ul style="list-style-type: none"> Take feedback about useful words that indicate what the question is about. Teach: <ul style="list-style-type: none"> Deconstruct example question to agree answer structure using shared reading of question. 	Teacher	3
Apply: <ul style="list-style-type: none"> Apply technique so far to their exam question by circling useful words and working out an answer structure. 	Pupils	4
Reinforce: <ul style="list-style-type: none"> Take feedback on the structure needed for the answer. 	Teacher	2
Teach: <ul style="list-style-type: none"> Provide pupils with success criteria/mark scheme for example question. Provide pupils with a model answer for exam question. Go over the model answer, identifying the use of specialist terms and connectives that 'flag up' the structure to the examiner. 	Teacher	3
Tune in: <ul style="list-style-type: none"> Identify key words needed for their exam question. Pupils model a starting sentence for their own answers. 	Pupils	5
Apply: <ul style="list-style-type: none"> Pupils use agreed structure and success criteria/mark scheme to write their own answers to the sample question (or another question provided to pupils). 	Pupils	10
Assess: <ul style="list-style-type: none"> Peer assess using success criteria. Feedback www (what went well) and ebi (even better if) on post-its. 	Pupils	10
Assess: <ul style="list-style-type: none"> Pupils annotate the model answer with suggestions as to what makes it a good answer. 	Pupils	5
Plenary: Think, Pair, Share 1 thing I have learned.	Pupils	4

Steps for writing

Use this sequence explicitly with pupils.

Step	Example
1. Establish clear aims.	The purpose of the writing is made clear to pupils – eg the purpose of writing a conclusion is to summarise findings and the explanation of the science underpinning it.
2. Provide example(s.)	Teachers provide an exemplar piece of writing or alternatively a good and a weak example for comparison; exemplars of other text types also available.
3. Explore the features of the text. 4. Define the conventions.	Use good questioning to identify the conventions/features at <ul style="list-style-type: none">• text level (eg.paragraphing: introduction, main development and conclusion)• sentence level (eg use of cause and effect connectives to enhance complex sentences), and,• word level (eg accurate use of vocabulary).
5. Demonstrate how it is written.	Teacher makes thinking process of writing a conclusion explicit to pupils whilst demonstrating the writing process, eg I am going to use an -er / –er sentence to describe the relationship between two variables.
6. Compose together. 7. Scaffold the first attempts.	Pupils have an opportunity to practise the teacher’s model collaboratively.
8. Develop independent writing.	In subsequent scientific enquiries, pupils will move towards independent writing of a conclusion.
9. Draw out the key learning. 10. Review.	Pupils are required to make their thinking about the writing process explicit; reinforcing learning.

Different types of science writing

These types of writing have conventions that pupils need to be taught.

Text type	Purpose in science
Explanation (of how and why)	<p>Explanation helps pupils develop their scientific knowledge and understanding and reveals misconceptions across all attainment targets.</p> <p>Explaining how helps pupils understand processes better by describing them, eg how digestion takes place, how light travels through materials.</p> <p>Explaining why helps pupils link ideas together. They use concepts, abstract scientific ideas and models to explain phenomena, e.g. explain why diffusion occurs using the particle model or why enzymes are needed for digestion together using concepts.</p>
Argument	<p>Constructing arguments is a skill pupils need to explore ideas and evidence. It helps pupils explore and see the significance of evidence. Questions relating to these aspects of How science works are features of the Key Stage 4 examinations.</p>
Conclusion	<p>Drawing conclusions, writing evaluations and constructing plans are skills needed for scientific enquiry. Drawing conclusions helps pupils describe patterns, generalise, and use scientific understanding to explain observations.</p>
Evaluation	<p>Writing evaluations helps pupils consider the reliability and validity of the evidence collected and suggest improvements.</p>

Some strategies to try

Ask pupils to compare the two examples in each case.

Pupil sheet A: Examples of explanations

Example 1: Explaining how digestion occurs

I want to explain how a piece of bread is digested.

First you place the bread, in your mouth and your teeth start to chew the bread breaking it down into smaller pieces whilst saliva mixes with it. Next, the saliva, which is an enzyme, starts to break up starch, which is a big molecule, into sugars.

You then swallow the sticky bread pieces. These are forced into your stomach by muscles squeezing it down your oesophagus. The food then enters the stomach where it is mixed with acids and enzymes. These help break the food down a little more.

Next the food mixture passes into the small intestine where more enzymes break the large molecules of fats and proteins into smaller ones. This allows the smaller molecules to pass through the intestine wall into the bloodstream. The intestine acts a bit like a sieve and only lets small molecules through.

What is left passes into the large intestine where water and mineral salts are absorbed. Finally what is left passes out of the body through the anus as faeces.

Example 2: Explaining how digestion occurs

This is an explanation of how digestion occurs.

After digestion you end up with faeces and food that has gone into the bloodstream. This happens because the food in your stomach and intestines has been broken down into smaller pieces by enzymes. Acid in your stomach helps break down food as well. In your mouth, there is an enzyme that changes starch, which is a big molecule, into smaller ones. You swallow your food when the muscles in your neck contract and force it down. They can only do this if there is a ball of food. You make this by chewing it with your teeth. Water passes through the large intestine into the body.

Digestion happens in stages, with different parts being absorbed in different places. This happens in the mouth, the stomach, the small intestine and the large intestine. Teeth chew on the food and mix it with water. This helps you swallow it. The stomach mixes things with the food and when the food ends up in the large intestine most of it has been absorbed into the blood stream and you are left with faeces.

Pupil sheet B: Examples of explanations

Example 1: Explaining air pressure

Air hitting the surface of things as it moves around causes air pressure. The density of the air can change and this makes the air pressure change. The higher the density of the air, the higher the air pressure. This is because there is more air to hit the surface because the air is thicker in denser air. In lower density air, the air is thinner. This means that the air pressure is lower. There is a lot of air around us but we do not feel the pressure because we are used to it.

Example 2: Explaining air pressure

Air causes pressure. Sometimes the air pressure is high and sometimes it is low. You can explain this using the idea that air is made up of particles.

The particles are very small and move very quickly in all directions so they sometimes hit the ground or you, or anything else in their way. Each time a particle strikes a surface it pushes against it so the air particle exerts a force on the surface.

Many millions of these collisions are happening every second. Consequently, this causes air pressure. If the air is not very dense, then there are fewer particles present and this causes low air pressure. Dense air causes high air pressure because there are more particles hitting the surface at any one time.

Pupil sheet

Examples of conclusions

Example 1

My results show me that some rocks fizz and some do not when acid is added. Hydrochloric acid made calcium carbonate fizz, sulphuric acid made sodium carbonate fizz and copper carbonate made hydrochloric acid fizz. Fizzing also happened between zinc carbonate and nitric acid and iron carbonate and hydrochloric acid. None of the other rocks fizzed. The reason for this is that there is reaction between some types of minerals that might be in rocks and acids. You could use this as a test for some minerals, but you could not tell which is which. The bubbles mean that a gas is made in the reaction. The gases I know about are hydrogen, oxygen and carbon dioxide, it could be one of these, but I would need to test them.

Example 2

My results show me that fizzing only occurs with those minerals that contain carbonate. The results also show that it doesn't matter what type of acid you use.

I conclude that carbonates react with acids to produce a fizz. You could use acids to test whether rocks contain carbonates or not.

The fizz means that a gas is given off. This gas is probably carbon dioxide, because it comes from a carbonate and the names are similar. I could test and be sure by seeing if the gas turns limewater milky.

Arguments for seeing because light enters the eyes

We need light to see things. Some people believe we see because light bounces off things and enters our eyes, others because light leaves our eyes, striking an object, so helping us see.

Argument 1

We must see because light enters the eye. We need light to see by, otherwise we would be able to see in the dark because light could come out of your eyes.

Argument 2

Seeing because light enters the eye makes more sense. We can't see when there is no light at all. If something was coming out of our eyes, we should always be able to see even in the pitch black. Another reason for believing this is that if you are standing outside looking into a dark room you cannot easily see things. If, however, light is let into the room from a window you can see things in it. This is because the light bounces off objects into your eye.

Pupil sheet

Examples of evaluations

Experiment

Comparing the porosity of different soil types (clay, sand, garden etc.). Water was poured onto soil and the time for it to trickle through was measured. Each soil was tested twice.

Evaluation 1

If I did this experiment again I would change the following things:

- I would use very fine soil rather than soil with small granules.
- I could try and sieve the sand to get rid of anything in it that isn't needed in the experiment (ie plants, stalks, humus).

Evaluation 2

The results show that for most soils there is good agreement between the first and second test. However, the garden and school soils show wide variation in the time taken for water to pass through between the first and second samples. This is probably due to the size of lumps in different samples. This means that measurements for these soils are not reliable.

To improve the experiment, I would sieve the soil first to get rid of the lumps. This would mean that each sample had a n even texture and this should lead to closer results so more reliability.

Pupil guidance sheet

Writing conclusions

Step 1: Describe the patterns

- Describe patterns or trends in graphs or data.
- Phrases to use:
 - comparative adjectives such as *longer, heavier, hotter* eg *The brighter the light the faster the plant photosynthesises*
 - *as the... so the...*
eg *As the number of batteries increases so the current increases*
- You may need to comment on how good the pattern is, eg *This is a good pattern because...* or *the pattern is not very strong.*

Step 2: Make a concluding remark

- Answer the original enquiry question.
- Phrases to use:
 - *To conclude..., I conclude that...* (related to original question or question and prediction)
 - *The experiment shows that..., In general, This means that...*

Step 3: Explain the conclusion

- Use the science you know or can find out to explain your conclusion. Say if this leads to another experiment.
- Phrases to use:
 - *This can be explained by..., As I predicted..., This is because..., The reason for this is..., To be sure I will need to test...*
- Aim to:
 - use paragraphs
 - use the present tense
 - use scientific words accurately.

Pupil guidance sheet

Writing explanations

Explaining how

You might want to explain **how** something happens or how something works. Start by stating what you want to explain and then use connecting words like those below.

- I want to explain how...
- First...
- Next...
- Then...
- Finally...

Explaining why

If you are trying to explain **why** something happens, you will need to start by stating what you are trying to explain. Follow this using connecting words and phrases like those below.

- I want to explain why...
- This is because...
- So when...
- A further reason is...
- Consequently...

Constructing arguments

My argument

- My idea is...
- My reasons are that...
- Arguments against my idea might be that...
- I would convince somebody that does not believe me by...
- The evidence I would use to convince them is that...

Pupil guidance sheet

Writing evaluations

Step 1

Make an opening statement about how good you think your evidence is.

- How reliable do you think your results are?
- Do you think the evidence you have collected is valid (eg was it a fair test)?

Things to consider

- Are there enough results to spot a pattern?
- If you repeated your measurements, is there wide variation or are they similar?
- How accurate are your measuring instruments?
- How accurate are your observations?
- What possible errors could have crept in?
- How confident are you about your results?

Step 2

Make some suggestions about how to improve your experiment.

Step 3

Explain why these suggestions would provide better evidence.