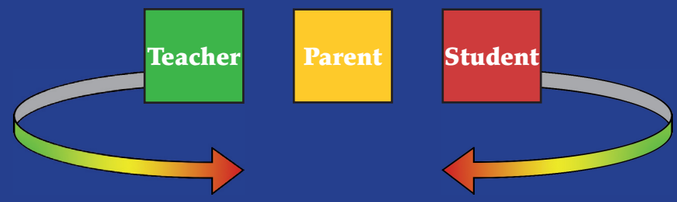
T
P
S

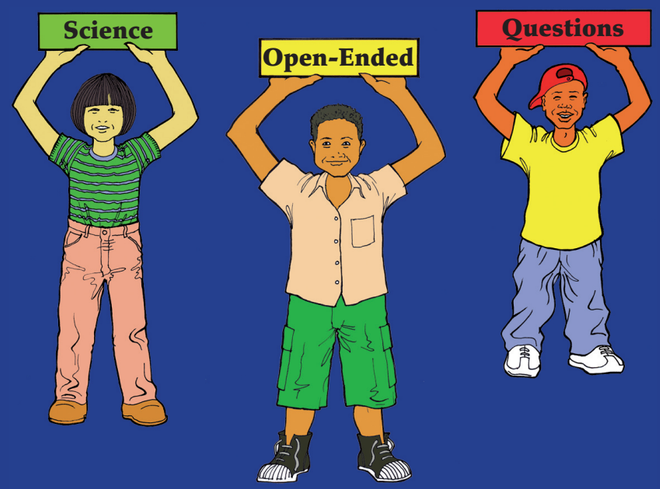
Critical Thinking in Science

Open-Ended Questions

Part 1



Teachers, Parents, Students a recipe for success.



ISBN 978-1-847003-99-7

Practice Workbook

Practice Workbook

Part 1 – Living Environment	Page	Key Idea(s)
1. Wild and Wooly	1	1, 5
2. Fish Made From Leaves?	6	6
3. Stay at Home and Eat	11	3, 4
4. Goodbye Pop, Hello Rubbish!	17	5
5. Aaaah-Choo!	23	5
6. Up, Up and Away	27	2, 3, 4, 5
7. Are You Living or Are You Not?	33	1
8. Is It This? Or Is It This?	39	3
9. Parts of a Whole	44	3
10. Yuck! What Is That Smell?	50	3, 4, 6, 7
11. Litterbug	55	1
12. Bye Bye Birdie	60	1, 3, 4, 5, 6, 7
13. Jack and the ~~Beanstalk~~ Peastalk	64	3, 4
14. Here Comes the Sun	70	5
15. Couch Potatoes	73	4, 5
16. May I Have this Dance?	78	3, 5
17. Lassie Come Home	82	2
18. Grin and Bear It	87	3, 5
19. The Early Bird Special	92	6
20. You've Got What It Takes	97	3

Dear Student,

Science is all around us and that is what makes it so interesting and so much fun! This book has many, many examples of science in everyday life. You will be able to read about something happening that deals with the science facts and situations that you are learning about.

It is important for your teachers to know if you understand the information they are sharing with you. They also want to know if you can apply the content and skills that you are studying. The examples in this book will help your teachers and will help you learn more about the science around all of us.

What will the question look like?

Often they will start off with one paragraph or a few paragraphs that describe a situation. These paragraphs will be followed by a series of questions about the reading. The questions might ask for some facts that you should know, like the organs in the respiratory system. Most likely they will ask you to take what you know and use it to figure out what is happening in the situation described.

Sometimes the questions will give you hints to help with the answer. In our example of the respiratory system the hint might be "be sure to include the organs outside the chest cavity in your answer." When you read that it should remind you to include the nose and mouth!

Other times your answer might include labeling a diagram or setting up a data table. Again, in our example you might be asked to complete a graph that shows the relationship between exercise and respiration rate.

An important thing to remember about these questions:

In these questions you will be asked to apply the science you know to the situation that you have just read about. These are also called "real-world application" questions. Getting practice in applying scientific concepts and the skills you have learned will help you understand that science is happening all around you every day.

How will the book help me?

This book will give you lots of practice reading about every day science issues and using what you know to understand what is happening. By thinking about what you have learned, you will be able to explain the natural phenomena around you.

Most of these examples are taken from newspaper and magazine articles that millions of people are reading every day. They have been summarized for you but they deal with questions and issues that exist in the real world. They will give you an idea of the kinds of problems scientists and government leaders must face on a day-to-day basis.

In addition, by completing the questions in the book, you will be getting more practice with this type of question. Your teacher will be able to tell if you understand the material. If you are having difficulty, your teacher will be able to help you in many ways. For instance, you might look at the science a different way or with different examples and that will make things much clearer for you. Also, if your teacher sees that you are especially interested in a topic or know a lot about it already, there may be some other activities you can do to learn even more.

How is the book set up?

This book has two parts. It has examples that deal with life science issues and those that deal with physical science issues. But remember, in the real world, these two areas often overlap so you might have to think of what you learned about chemistry, for example, to help answer a question about pollutants affecting baby birds.

Each of the examples will have a few paragraphs summarizing the situation. There will be several questions related to the situation.

For each question there is a Discussion section that will help you review what you should know about the topic. This section describes the kinds of information you should have been thinking about as you answered the question.

There is a Sample answer section which gives an example of an acceptable answer. Remember that your answer does not have to be exactly like this one but it should contain the same kind of information.

You can compare your answer to the sample one. Think about what you wrote and change it for a more complete answer if necessary. This is called "reflection" and it is something that scientists do often to think about what they are learning.

Important Suggestions:

Read the paragraph carefully - You will probably find that the situations are very interesting. They may even be about something in the news that you are especially interested in, like space travel, or animals, or pollution. Read carefully and go back to the passages to review what has been said as you answer the questions.

Answer the question that is asked - If the question says "explain" you should explain. If the question says "diagram" you should diagram. You should practice following directions. Learning science involves learning concepts and skills. Your teachers want to know that you understand both. If you explain the concept of a food web, for example, when the question is designed to make sure you know how to draw a food web, you will not have answered the question correctly.

Do not write too much - If the question asks for two examples, give two. If you add more examples you may run the risk of giving inaccurate information.

Look for hints in the question and/or directions - Sometime there will be guidelines built right into the question. You might be asked to make a list of the planets in our solar system "starting with Mercury". By looking for hints, you will already have one of the answers.

Use complete sentences - Sometimes you will be directed to use complete sentences in your answer but even if you are not, it is still a good idea. You may know exactly what you mean with a word or two but the person reading your answers may not. If you use complete sentences and describe what you mean, your ideas will be understood better.

Do not leave blanks - Make a try. One of the nice things about writing your own answers is that you have a chance to give some of your ideas on a subject even if you are not 100% sure of the answer. If you are asked about sound waves but you can only remember information on light waves, you can try to make some comparisons or generalizations. You may be surprised on how close you come to the answer.

Have fun - Exploring science and the natural world is a lot of fun. You should keep this in mind as you work in your science classes, travel around outside your school, or try to figure out how things work. Hopefully, the passages you read in this book and the science concepts and skills that you review will help you on your exams and keep you interested in learning more and more science!

Dear Teacher,

This book is designed to give your students practice in answering questions and building their literacy skills in science. You can use them in a number of ways including, but certainly not limited to, review for national exams, as formative assessments during a unit, as homework, or as a "Do Now" to begin class. They are designed to help you assess your students progress on an on-going basis.

The examples in this book begin with a few paragraphs describing some scenario. The scenario includes several scientific concepts with which the student should be familiar. The paragraphs are followed by questions that ask the student to apply what he or she knows about the topic. Sometimes the student will be asked to complete a graph, draw or label a diagram, analyze some data that is graphically represented, or some other skill common to science learning.

They require the student to read and understand the situation described but also to apply the science concepts studies in order to answer the questions.

Usually there are several questions asked about each situation presented. Students are required to draw on the science they have learned over time to make sense of this new context and accurately answer the questions. Questions are often "scaffolded" to help the student come to the final answer in a step by step way. They are often given hints in the question itself, such as "be sure to include…in your answer".

These examples have been designed specifically to test a wide range of science and literacy skills. They deal with science content but also assess science skills such as working with models, making predictions, drawing and labeling diagrams, and reading charts and graphs. The requirement to gather their information from a number of sources, present their thoughts by writing in a clear way, and then self-assess by reflecting on how their answers compare to those in the book help students practice process thinking and communicating their ideas.

Reviewing your students' use of science content and their success in communicating their ideas in writing will help you plan further lessons and differentiate your instruction where necessary to ensure higher student achievement in science class.

"Poetry in Motion"

"Haiku" (say "hi-coo") is a type of poetry that started in Japan in the 1600's. It is a way of describing nature and things that happen in nature. Usually, haiku is a poem of only three lines or 17 syllables. It doesn't rhyme like some poems you may have heard.

Here are two examples of haiku. They describe two processes that happen in nature all the time:

Haiku I

Mad rain, tumbling stream
Bite corners off pointed rocks –
Smooth stones, velvet soil.

Haiku II

Water seeps in cracks
Freezing, pushing, splitting out –
Pebbles run away.

1. These poems do not have titles. Pick one of the poems. Explain what natural process it is describing. Give it a title.

2. Why are the rocks and pebbles on riverbeds usually smooth?

Try answering the questions:

Answer to question 1

Answer to question 2

LET'S TALK ABOUT IT

1. Carefully read the two haikus. Try to imagine the process that is being described. You know that scientists do a lot of "observing". Sometimes imagining is observing too!

   In "Haiku I" you can imagine rain beating down and rocks tumbling in a stream. After a while, rocks are broken down. They become smooth from all the tumbling. Soil is rocks broken down into tiny, tiny pieces. When rocks are carried away it is called erosion. Maybe "Erosion" would be a good title for this poem.

   "Haiku II" describes a way that rocks crack apart and get broken down into smaller rocks. This is because water gets into cracks and freezes. You know that water expands (or gets larger) when it freezes and turns to ice. Ice is very strong! It can push rocks apart until they break. When the pieces fall off of the rocks they "run away" or roll away. The process of rocks getting broken up by water is called "weathering".

   The question says to choose a poem and explain the natural process. Pick any title you want for the poem.

Sample answer:

Haiku I describes erosion. It talks about streams carrying rocks away and knocking off the edges until they are smooth. I might call this poem "Soft Rocks".

Sample answer:

Haiku II describes weathering because it talks about water freezing and cracking rocks into smaller pieces. I might call this poem "The Big Break".

2. Haiku I tells the answer to this question. Rocks on riverbeds are smooth because they have been bounced along in the water. The edges have been worn down from hitting other rocks.

This example shows that sometimes when you are taking tests, one question can give you a hint to another one. There is nothing wrong with going back to add to an answer you already have written. It is a sensible thing to do. Go back and revise your work if you can make it better.

Sample answer:

Rocks on riverbeds are smooth because they have been hitting other rocks. They get worn down as the water passes over them.

REFLECTION

How do the sample answers compare to your answers?

How could you improve what you have written?

Reflect on question 1

Reflect on question 2