Science Mastery Series

LiSC® Answering Technique

For Upper Primary Science

FIRST & ONLY PSLE Science Answering Technique Handbook

A handbook for astute parents

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PREFACE

Primary Science Syllabus Requirement

The Primary School Leaving Examination (PSLE) assesses students' attainment in Science with respect to the objectives stated in the syllabus. The objectives include the ability to demonstrate knowledge and understanding of scientific concepts and principles as well as application of such understanding to new situations using one or a combination of the process skills.

The Ministry of Education has incorporated a total of 11 process skills into the primary-level Science syllabus and students are expected to apply them well in the topics classified under the 5 themes, namely Diversity, Cycles, Systems, Interactions and Energy.

With the content reduction and flexibility provided in the delivery of topics within lower and upper block in the current syllabus, schools have adopted varied teaching strategies and activities centred around the process of scientific inquiry to provide students with a wide array of experiences to change their tenaciously held preconceptions through both hands-on and hypothetical means.

Challenges in Doing Well

Being very familiar with the requirements of the assessment system, many students are still bewildered by their under-achieving results despite having a good grasp of concepts and faithfully attempting numerous onerous sets of practices to refine their skills. Most students tend to achieve high score for the multiple-choice section with an average score for the open-ended section, revealing the need to tighten their answering technique.

Instead of a segment of lessons dedicated to the learning of answering technique, schools adopt a holistic approach to the learning of Science with the teaching of content, process skills and answering of questions all integrated into the daily curriculum. This makes it tough for students to pick up the answering techniques specifically and very often, leads them to spend time on (less relevant) practices which do not help them to accurately express their thoughts with clarity.

Without explicit teaching and learning of answering techniques, students tend to reach a plateau in their open-ended section. Many teachers have often reminded students to be specific in their answering but such simple reminders serve no added value to many who are clueless to what it actually entails.

Overcoming the Challenges

These are some of the major challenges we observed and experienced first-hand in our years as Heads of Department for Science and involvement in various relevant planning and research committees. The depth of knowledge on the assessment criteria from our years as markers and Assistant Supervisors of Marking for PSLE Science provide us the impetus for our action-research studies, LiSC® for Science Heuristics™, and now this series of books.

Doing well in Science examinations requires a good grasp of concepts and the ability to articulate the application of these concepts and skills in a concise and accurate manner. The LiSC® methodology has been field-tested over thousands of students over the years of our teaching, yielding high-success rate in helping students improve on their open-ended section.

About this Series

There are many guidebooks with 'tons' of factual information available for students to master their content and even those beyond the syllabus, but *there is currently no guidebook* that ***explicitly pin-point the approach*** to improve answering skills (technique).

This series of books is the culmination of our years of research and experience in marking, teaching, guiding teachers and students in the differentiation of sound answers and questions, and is currently the ***First and Only*** series available to guide students and parents in the mastery of science process skills and answering techniques. The entire LiSC® series provide a complete and comprehensive guide from the understanding of concepts (Concept Evaluation) to the mastery of Processes and Skills (Process Skills) to answering perfection (Answering Technique), each targeting a different aspect to help students achieve excellence in Science examinations.

This particular book in the series, **LiSC® Science Mastery Series – LiSC® Answering Technique for Upper Primary Science**, aims specifically to help those who already have a good grasp of concepts and are seeking a *breakthrough in their answering*. Through this book, students will understand the meaning of active application of concepts to new situations, bridge the gap they encountered in articulating their thoughts, and thus attain improvement in their results from the minimisation of marks loss due to inaccurate, non-precise and incomplete answers.

To facilitate the use of this guidebook, we have neatly segmented the LiSC® methodology into logical sections and sub-sections. For each section, we offer examples on both Life Science and Physical Science and detailed explanation of the application in easy-to-follow steps and visualizations.

It is hoped that, through this book, parents and students will have a clear understanding of the PSLE Science examination marking requirements. Together with a guided and systematic approach to answering, answers can be refined and fine-tuned to perfection.

Cedric Chai, Alda Lim
Founder, Science Heuristics Private Limited,
Speaker and Recipients of various National Awards

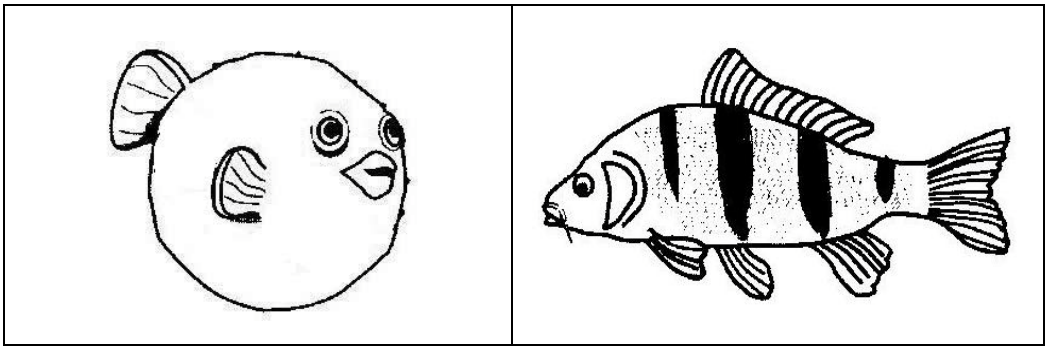
Part II:

THE KEYS

EXAMPLES

1. ***LIFE SCIENCE***

The diagrams below show two types of fish. Study them carefully and answer the question that follows.



Fish A Fish B

Explain two ways in which Fish B is better adapted at survival than Fish A.

ANSWER

i. Fish B has ***stripes*** on its body to ***camouflage*** and hence hide better while Fish A does not.

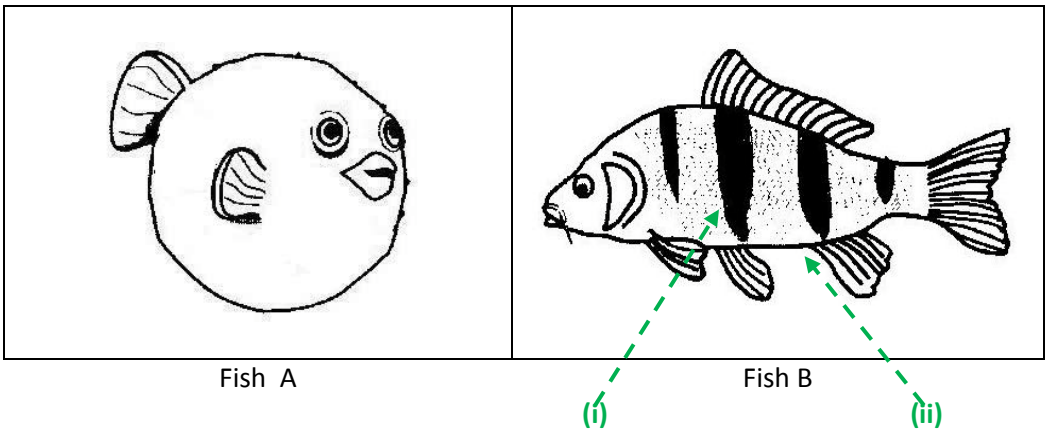
ii. Fish B has a ***streamlined body*** and hence can ***swim faster*** than Fish A.

LiSC® APPROACH – DIAGRAM KEY:

Identification of *FEATURES* that differentiate the diagrams provided.

EXPLANATION

Analyse the diagrams carefully. Identify features that only Fish B possesses.



Explanation for Answer to Part (i):

Applying the '*Li*' approach (LiSC® Answering Tech.)	Formulation of Answer	Detailed Explanation
Identify the Key (Diagram)	Fish B Stripe	The presence of stripes is a prominent feature of Fish B that Fish A does not have.
Identify the concept tested	Adaptations	As provided in the question, the Concept or topic tested is on Adaptations (P6 – Interactions).
Linking the Key to Concept tested	Camouflage	Stripes are linked to the concept of camouflaging in the topic of Adaptations.
Final Result	Hide better	Camouflaging refers to the same concept of hiding well.

Explanation for Answer to Part (ii):

Applying the '*Li*' approach (LiSC® Answering Tech.)	Formulation of Answer	Detailed Explanation
Identify the Key (Diagram)	Fish B Flat body	The difference in body shape is another obvious feature in the diagrams.
Identify the concept tested	Adaptations	As provided in the question, the Concept or topic tested is on Adaptations (P6 – Interactions).
Linking the Key to Concept tested	Streamlined body shape	The specific term used in the topic with reference to shapes is the key word and concept - streamlined.
Final Result	Swim faster	Having a streamlined body shape will lead to lower water resistance and hence enabling the fish to swim faster.

PARENTS ALERT

It is not necessary to identify the species or type of fishes A and B are. Neither is it necessary to have ***prior knowledge*** about the special characteristics of Fish A or Fish B.

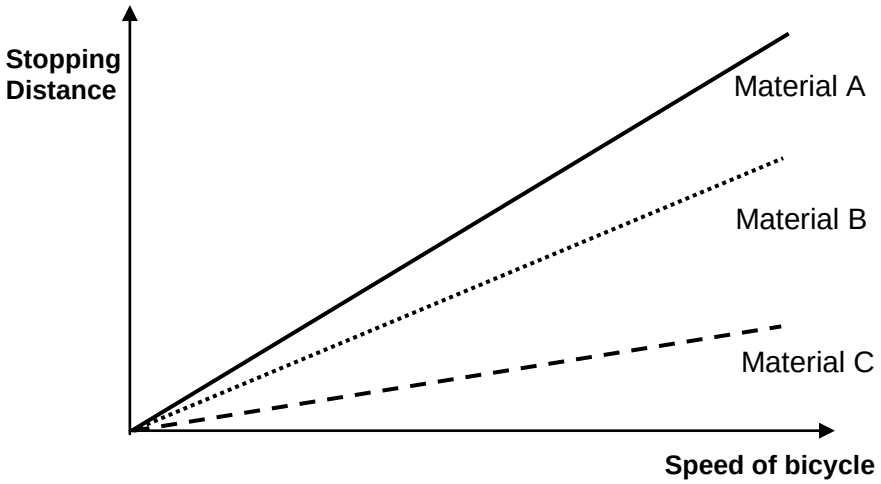
It is important that students derive the difference in characteristics from the given diagram itself. Any other characteristics from external knowledge source ***not featured*** in the diagrams ***will not*** be awarded marks in actual examinations marking.

Example of external knowledge that is not necessary or relevant:

Fish A is a puffer fish and has poisonous spikes.
or
Fish B resembles a tiger barb.

3. ***PHYSICAL SCIENCE***

Apple conducted an experiment on three different types of bicycle tyres. The graph below shows the results of her experiment.



Give a possible conclusion for Material C.

ANSWER

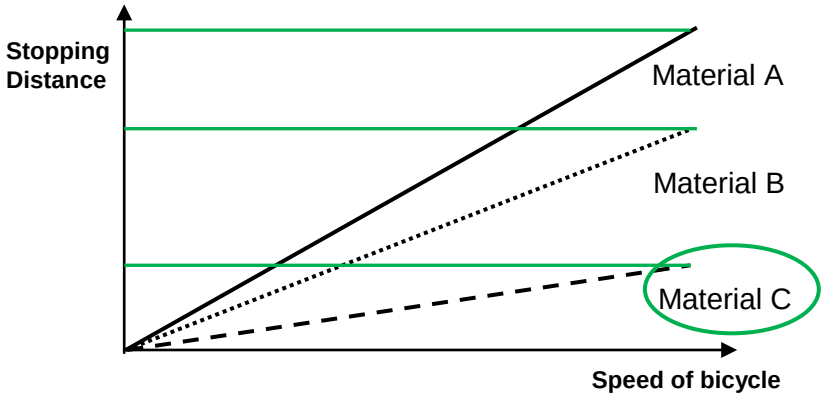
Material C has the ***roughest texture*** as it produces the ***most amount of friction*** between the tyres and the surface, causing the stopping distance to be the shortest.

LiSC® APPROACH – GRAPHICAL KEY:

Comparison of *GRAPHICAL DATA*, focusing on the difference.

EXPLANATION

Compare the graphs and identify the difference.



Applying the '*Li*' approach (LiSC® Answering Tech.)	Formulation of Answer	Detailed Explanation
Identify the Key (Graphical)	Material C – shortest stopping distance	Identification of key difference in graphical data.
Identify the concept tested	Frictional force	Tyres and stopping distance are WORD KEYS that lead to the concept of Friction.
Linking the Key to Concept tested	Most amount of friction;	To stop at the fastest rate, the amount of friction generated must be the greatest.
Final Result	Roughest Texture	Further link of concept on Friction to Material property.

CHAPTER 8 FINAL NOTE

Qualifications

This is *NOT an assessment book*. It is a *Handbook to Science Answering Technique*. The primary objective of this book is to guide students and parents to produce sound answers for Science examinations. Hence, the questions provided are meant as beacons of examples to parts of the LiSC® Answering Technique rather than drill and practice questions.

It is important to note that only parts of the entire question are used in the examples in this book. This helps to ensure that the right focus and attention is given to the specific components covered without distracting readers with other unrelated parts.

The parts omitted from the examples are usually the fundamental process skills section of the questions or the direct knowledge application parts. Focus has instead been given to the Application and Higher Order parts of the questions, often the most demanding and daunting for students.

Application

Another important note is the wider Application of the *LiSC® Answering Technique*. Much as the examples have been restricted to the Open-Ended Section of the examination paper, the technique can be simply applied across the Higher Order questions in the Multiple Choice Section of the examination paper. The Approach is of exact means albeit the phrasing and writing of the formulated answer.

In Practice

Though the approach appears tedious and time consuming, it is effective and efficient in getting students to the right analytical path for Application and Higher Order questions. The *LiSC® Answering Technique* equips students with a proven and simple-to-apply tool to tackle abstract and unfamiliar examination questions. With the right practice, students not only become effective applicators of knowledge, they would have also gained substantial insight into a proven and powerful meta-cognitive problem solving approach.

In Summation

The summary purpose of this book is to *bridge the gap* between Acquired Knowledge (Knowledge with Understanding) and Applied Situations. As such, there must be a good grounding and foundation laid in the Acquired Knowledge department first. Understanding of knowledge and concepts must never be confused with mere memorising of scientific facts or principles. Without the former, the *TOOL* (*LiSC ®Answering Technique*) cannot be effectively and properly utilised.

Start right, build a strong foundation and with the right practice and proper use of the *TOOL* (*LiSC® Answering Technique*), answers to Science examination questions can only be Perfect – *Complete, Precise and Accurate*.

NOTES