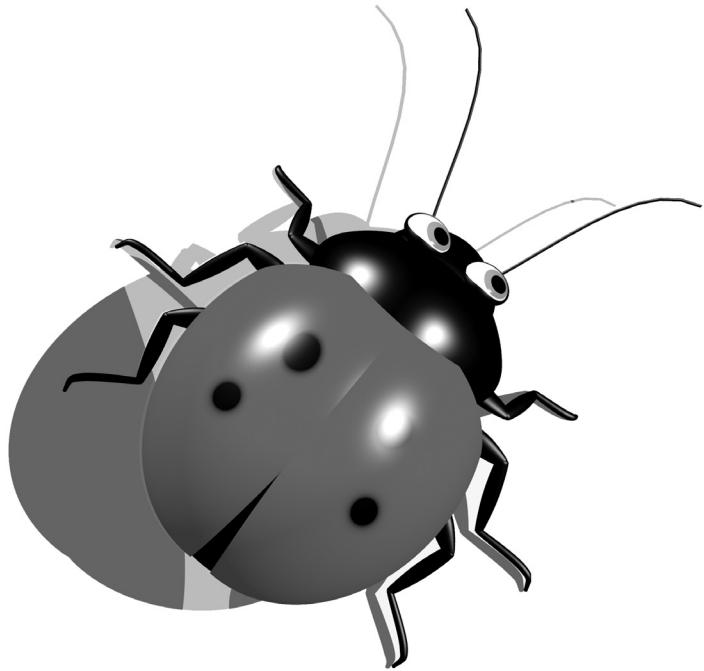


Real Science-4-Kids

Teacher's Manual



Pre-Level I

R.W. Keller, Ph.D.





Cover design: David Keller
Opening page: David Keller, Rebecca Keller
Illustrations: Rebecca Keller

Copyright © 2008 Gravitas Publications, Inc.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission from the publisher.

Real Science-4-Kids: Biology Pre-Level I Teacher's Manual

ISBN 978-0-9799459-2-2

Published by Gravitas Publications, Inc.
P.O. Box 4790
Albuquerque, NM 87196-4790

Printed in United States

A note from the author

This curriculum is designed to provide an introduction to Biology for students in kindergarten through third grade. The student laboratory manual is intended to be the first step in developing a framework for real science. The series of experiments in the laboratory manual will help the students develop the skills for the first step in the scientific method: making good observations.

There are different sections in each chapter. In some chapters there is a section called "Observe it" and this section helps the student focus on any observations needed. The "Think about it" section provides questions for the students to think about before they begin the experiment. In some chapters there is a "Test it" section that directs the students in setting up the experiment, collecting any data, and observing what happens. In every chapter there is a "What did you discover?" section that gives the students an opportunity to summarize the observations they have made. And finally, in each chapter there is a section called "Why" that provides a short explanation for what they may or may not have observed.

The experiments take up to 1 hour. The materials needed for each experiment are given on the next page.

Enjoy!

R. W. Keller

Materials at a Glance

All of the materials needed for each experiment are given in the following chart:

Experiment 1	Experiment 2	Experiment 3	Experiment 4	Experiment 5	Experiment 6	Experiment 7	Experiment 8	Experiment 9	Experiment 10
cotton balls rubber ball tennis ball banana apple rocks legos or building blocks	pencil	(2) small house plants water	(2-4) white carnations (2-4) small jars food coloring water	(2) small jars (2) or more beans absorbent white paper plastic wrap clear tape (2) rubber bands	microscope with a 10X objective (Gravitas Publications Inc., MOO1) eye dropper pond water or protozoa kit (WARD's Protist Set 1, 87-D-1530) plastic culture slide (WARD's 14-D-3510)	same as experiment 6 optional: Baker's yeast Eosin Y (WARD's 945 V 4102)	butterfly kit small cage _____	tadpoles aquarium water tadpole food	clear glass or plastic tank small plants soil small bugs such as: worms ants beetles
					[Protozoa can also be observed in hay water. To make hay-water, cover a clump of dry hay and let it stand for several days at room temperature.]		[butterfly kits can be purchased from a variety of different sources such as Insect Lore at www.insectlore.com]		

Contents

EXPERIMENT 1: WHERE DOES IT GO?	1
EXPERIMENT 2: WHAT DO YOU NEED?	6
EXPERIMENT 3: WHO NEEDS LIGHT?	11
EXPERIMENT 4: THIRSTY FLOWERS	15
EXPERIMENT 5: GROWING SEEDS	19
EXPERIMENT 6: LITTLE CREATURES MOVE	23
EXPERIMENT 7: LITTLE CREATURES EAT	27
EXPERIMENT 8: BUTTERFLIES FLUTTERBY	31
EXPERIMENT 9: TADPOLES TO FROGS	34
EXPERIMENT 10: CREATURES IN BALANCE	37

Experiment 1

Where does it go?

Materials needed:

- cotton balls
- rubber ball
- tennis ball
- banana
- apple
- rocks
- legos or building blocks

In this unit, the students will try to sort different items into different groups.

The objectives of this lesson are:

- (1) to help students understand that there are different ways to sort objects.*
- (2) to develop a vocabulary to describe the objects they observe.*

I. Observe it.

In this section the students will make careful observations for each object they have collected.

- ❶ Put the objects on the table and have the students look carefully at each item.
- ❸ Encourage the students to use both words and pictures to describe the object. First help them observe different details such as size, color, shape and texture for each item. Use questions to help them describe the object.

What color is a cotton ball?

What color is a banana?

What is the shape of a cotton ball?

What is the shape of a rock?

How would you describe the surface of a tennis ball?

- ❸ Next help them notice features that are similar and different between items.

Is a rubber ball larger or smaller than a cotton ball?

Is a rubber ball harder or softer than a cotton ball?

Is a rock like a banana? Why or why not?

Is a tennis ball similar to a banana? Why or why not?

Encourage the students to use as many different describing words as possible for each item. Their answers may look something like this:

I. Observe it.

tennis ball

fuzzy round hard yellow

cotton ball

fuzzy round soft white

rock

hard grey smooth heavy

building block

square hard blue plastic

II. Group it.

Next have the students look at the different objects and the different ways they have used to describe the objects. Help them think about how they might group the objects. Have the students pick five different groups and help them write the names of the groups in the space provided. Have the students sort the objects they have collected into the different groups. Each object can only go into ONE group.

<i>round</i>	<i>yellow</i>	<i>small</i>	<i>hard</i>	<i>white</i>
<i>tennis ball</i>	<i>banana</i>	<i>rock</i>	<i>block</i>	<i>cotton ball</i>
			<i>rubber ball</i>	<i>apple</i>

Help the students notice that some items can fit into more than one group. For example, if they picked both "round" and "yellow" a tennis ball can fit into both groups. Have the students think about how they might rearrange the groups, picking different items that go into each group. They can resort their items into the groups they've already chosen or they can pick new groups.

There are no "right" answers, so encourage the students to think about all of the different ways they may want to sort the items.

III. What did you discover?

The questions can be answered verbally or in writing, depending on the writing ability of the student. With these questions help the students think about their observations. Again, there are no “right” answers to these questions and it is important for the students to write or discuss what they actually observed. Help them write about or describe which objects could fit in more than one group.

IV. Why?

It is important for students to understand that science is often a dynamic endeavor and the “answers” that science provides can sometimes change. The identification and grouping of living things can be fairly complicated and determining exactly which group to fit which living thing is not trivial. There are different criteria used to group living things. Most living things are first grouped according to the types of cells it has—plant cells, animal cell, bacterial cell etc. Once the organism is grouped according to cell type, then the scientist looks for other features to categorize the organism.