

Physical Science

*with Earth and
Space Science*

Investigations

Tom Hsu, Ph.D.

cpo
science

FIRST EDITION

CPO Science

Peabody, Massachusetts 01960

The cover colorfully combines illustrations of the forces of nature studied in the various fields of the physical sciences. Here, the “evolving tapestry of conceptual thinking” begins with water. Water droplets dance with the planets including our own watery planet and Saturn with its icy rings. Water reappears in the combustion reaction of methane, as the substance on which plants depend, as pounding waves, and, on the back cover, as the darkening clouds of a coming storm. From this cycle of water, a modern bicycle rolls into a graphical interpretation of white light split into its rainbow of wavelengths and a fiber optic. You may lose yourself in many of these images which represent hundreds of years of scientific and technological innovation. Nevertheless, that our innovations are inextricably woven into and from the natural world is illustrated by the images of Earth and the spiral connection between the DNA helix and a bicyclist ever-moving forward. On the back cover, images from physics, chemistry, and earth and space science move around a chambered nautilus seen through the windows of the Golden Rectangle. We at CPO Science with Bruce Holloway, the spirited illustrator of the cover, hope these images will inspire your interest and excitement about the discovery of science.

The CPO Science Development Team

Foundations of Physical Science with Earth and Space Sciences - Investigations

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












CPO Science
26 Howley Street,
Peabody, MA 01960
(866) 588-6951
<http://www.cpo.com>

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USING ICONS TO LOCATE INFORMATION

Icons are symbols that have meaning. They are small pictures that convey meaning without words. In the CPO program we use icons to point out things such as safety considerations, real-world connections, and when to find information in the reference pages, complete a writing assignment, or work in a team. The chart below lists the icons that refer to instruction and safety and the meaning for each one.

	Reading: you need to read for understanding.		Real-world connections: you are learning how the information is used in the world today.
	Hands-on activity: you will complete a lab or other activity.		Teamwork: you will be working in a team to complete the activity.
	Time: Tells how much time the activity may take.		Economics: you are learning about how science impacts the economy.
	Research: you will need to look up facts and information.		Formula: you are reading information about a formula or will need to use an equation to solve a problem.
	Setup: directions for equipment setup are found here.		Use extreme caution: follow all instructions carefully to avoid injury to yourself or others.
	History: you are reading historical information.		Electrical hazard: follow all instructions carefully while using electrical components to avoid injury to yourself or others.
	Environment: you are reading information about the environment or how to protect our environment.		Wear safety goggles: requires you to protect your eyes from injury.
	Writing: you need to reflect and write about what you have learned.		Wear a lab apron: requires you to protect your clothing and skin.
	Project: you need to complete an assignment that will take longer than one day.		Wear gloves: requires you to protect your hands from injury due to heat or chemicals.
	Apply your knowledge: refers to activities or problems that ask you to use your skills in different ways.		Cleanup: includes cleaning and putting away reusable equipment and supplies, and disposing of leftover materials.

INVESTIGATION TEXT

Investigations are hands-on activities that accompany the student text. For each section of the text, you will complete a hands-on activity, answer key questions, and find results. The Investigation Manual is a soft cover book containing investigation activities that accompany each section you are reading. Sometimes you will read the student text before doing an Investigation activity, but usually you will complete the Investigation before you read the section.

The Investigations are the heart of the CPO program. We believe that you will learn and remember more if you have many opportunities to explore science through hands-on activities that use equipment to collect data and solve problems. Most of the Investigations rely on the use of CPO equipment to collect accurate data, explore possibilities and answer the key question. The equipment is easy to set up, and your teacher will help you learn how to use the equipment properly.

FEATURES OF THE INVESTIGATION

Key Question: Each Investigation starts with a key question that conveys the main focus of the learning. This question tells you what information you need to collect to answer the questions at the end of the Investigation.

Data Tables: Data tables help you organize and collect your data in a systematic manner.

Learning Objectives (Goals): At the top of each Investigation are the learning goals. These statements will explain what you will have learned and can do after completing the investigation.

Brief introduction: This information helps you understand why the exercise is important and, in most cases, how it connects to other sections you have read or will be reading.

Icons and Section title: The icon reminds you of the unit that you are studying and the section title. This section title corresponds to the reading in your Student Edition.

Numbered Steps: The Investigation sequence numbers point out the sequence of steps you will need to follow to successfully complete the Investigation. These steps highlight specific stages of the scientific method such as: following directions, completing hands-on experiments, collecting and analyzing data and presenting the results. The Applying Your Knowledge step asks you to reflect on what you have learned.

Illustrations: The illustrations support your understanding of the Investigation procedures.

Fill-in answer sheets: Your teacher will provide you with answer sheets to fill in the data tables and the written responses and may collect your information. You can also use the sheets to reinforce your reading in your student text.







SAFETY

In scientific investigations, you often work with equipment and supplies. These are fun to use, especially because they help you make discoveries. However, using equipment and carrying out certain procedures in an investigation always require safety. Safety is a very important part of doing science. The purpose of learning and discussing safety in the lab is to help you learn how to be safe at all times.

The Investigations that you will be doing as part of the CPO Integrated Physics and Chemistry curriculum are designed to reduce safety concerns in the laboratory. The physics Investigations use equipment that is stable and easy to use. The chemistry Investigations use household supplies and chemicals. Although these chemicals might be familiar to you, they still must be used safely.

You will be introduced to safety by completing a skill sheet to help you observe the safety aids and important information in your science laboratory. In addition to this skill sheet, you may be asked to check your safety understanding and complete a safety contract. Your teacher will decide what is appropriate for your class.

Throughout the Investigation Guide, safety icons and words and phrases like “caution” and “Safety Tip” are used to highlight important safety information. Read the description of each safety icon carefully and look out for them when reading your Student Edition and Investigation Guide.

	Use extreme caution: follow all instructions carefully to avoid injury to yourself or others.
	Electrical hazard: follow all instructions carefully while using electrical components to avoid injury to yourself or others.
	Wear safety goggles: requires you to protect your eyes from injury.
	Wear a lab apron: requires you to protect your clothing and skin.
	Wear gloves: requires you to protect your hands from injury due to heat or chemicals.
	Cleanup: includes cleaning and putting away reusable equipment and supplies, and disposing of leftover materials.

Safety in the science lab is the responsibility of everyone! Help create a safe environment in your lab by following the safety guidelines from your teacher as well as the guidelines discussed in this document.