

Review Packet – Preface

This Review Packet has been compiled to provide an overview of the six-volume curriculum materials Powerful Ideas in Physical Science.

Each volume contains the chapter entitled Constructing Your Course. This chapter outlines the strategy of building a course using these flexible materials to meet and pace the teacher's personal and conceptual needs as well as the needs of his/her students. The aim of Powerful Ideas is to provide a course model to enable the professor to create an environment whereby undergraduate students can develop strong conceptual understanding of physical science through examination of everyday phenomena.

The six volumes: Light and Color, Electricity, Heat and Conservation of Energy, Nature of Matter, Motion, and Force can be used either chronologically or in optional sections. Each volume contains Student Materials and Instructor Materials. The Instructor Materials include an overview of the unit and the student activity pages embedded with instructor notes. The bold-faced number of footer at the bottom middle of each page [example L1.1(2)], indicating the topic, investigation and activity, and page of the specific activity, are designed to help the user easily cross reference the Student Materials with the Instructor Notes.

Among other items, this Review Packet contains samples of the parallel student and instructor materials for each volume. Listed below are links to the contents of the review packet.

- I. Introduction**
- II. Constructing Your Course – Sample Pages**
- III. Volume 1 – Light and Color**
 - A. Instructor Materials – Sample Pages
 - i. [Light and Color, Instructor Materials – Table of Contents](#)
 - ii. [Introduction](#)
 - iii. [Student's Notions about Light and Color](#)
 - iv. [Cognitive Rationale](#)
 - v. [Instructor Notes - Equipment List](#)
 - vi. Instructor Notes – Student Activities with Embedded Instructor Notes
 - 1. [Activity L1.1: How does light leave a bulb?](#)
 - 2. [Activity L1.2: What are Shadows?](#)
 - vii. Instructor Notes – Focus on Science
 - 1. [Focus on Science L1.1: Light and Illumination](#)
 - viii. Instructor Notes – Homework
 - 1. [Homework L1.1: Complex Shadows](#)

- B. Student Materials – Sample Pages
 - i. [Light and Color, Student Materials – Table of Contents](#)
 - ii. Student Investigations/Activities
 - 1. [Activity L1.1: How does light leave a bulb?](#)
 - 2. [Activity L1.2: What are Shadows?](#)
 - iii. Focus on Science
 - 1. [Focus on Science L1.1: Light and Illumination](#)
 - iv. Homework
 - 1. [Homework L1.1: Complex Shadows](#)

IV. Volume 2 – Electricity

- A. Instructor Materials – Sample Pages
 - i. [Electricity, Instructor Materials – Table of Contents](#)
 - ii. [Introduction](#)
 - iii. [Student’s Notions about Electricity](#)
 - iv. [Cognitive Rationale](#)
 - v. [Instructor Notes - Equipment List](#)
 - vi. Instructor Notes – Student Activities with Embedded Instructor Notes
 - 1. [Activity E1.1: What conditions do you think enable the bulb to light?](#)
 - 2. [Activity E1.2: Where is the circuit in a flashlight?](#)
 - 3. [Activity E4.1: Generating charged tape](#)
- B. Student Materials – Sample Pages
 - i. [Electricity, Student Materials – Table of Contents](#)
 - ii. Student Activities/Investigations
 - 1. [Activity E1.1: What conditions do you think enable the bulb to light?](#)
 - 2. [Activity E1.2: Where is the circuit in a flashlight?](#)
 - 3. [Activity E4.1: Generating charged tape](#)

V. Volume 3 – Heat and Conservation of Energy

- A. Instructor Materials – Sample Pages
 - i. [Heat and Conservation of Energy, Instructor Materials – Table of Contents](#)
 - ii. [Introduction](#)
 - iii. [Student’s Notions about Heat and Conservation of Energy](#)
 - iv. [Cognitive Rationale](#)
 - v. [Instructor Notes - Equipment List](#)
 - vi. Instructor Notes – Student Activities with Embedded Instructor Notes
 - 1. [Activity H2.1: Is it hot or is it cold?](#)
 - 2. [Activity H2.2: Can you tell hot from cold?](#)
 - 3. [Activity H4.1: Freezing and Melting](#)

- vii. Instructor Notes - Focus on Science
 - 1. Focus on Science H1.1: Melting and Energy Exchange
- viii. Instructor Notes - Homework
 - 1. Homework L1.1: An Olympic Event

B. Student Materials – Sample Pages

- i. Heat and Conservation of Energy, Student Materials – Table of Contents
- ii. Student Activities/Investigations
 - 1. Activity H2.1: Is it hot or is it cold?
 - 2. Activity H2.2: Can you tell hot from cold?
 - 3. Activity H4.1: Freezing and Melting
- iii. Focus on Science
 - 1. Focus on Science H1.1: Melting and Energy Exchange
- iv. Homework
 - 1. Homework H1.1: An Olympic Event

VI. Volume 4 – Nature of Matter

A. Instructor Materials – Sample Pages

- i. Nature of Matter, Instructor Materials – Table of Contents
- ii. Introduction
- iii. Student’s Notions about Nature of Matter
- iv. Cognitive Rationale
- v. Instructor Notes - Equipment List
- vi. Instructor Notes – Student Activities with Embedded Instructor Notes
 - 1. Activity M1.1: Will it sink or float?
 - 2. Activity M1.4: How is density related to floating and sinking?
 - 3. Activity M3.3: What happens when water boils?
- vii. Instructor Notes - Focus on Science
 - 1. Focus on Science M1.1: Fundamental Quantities: A Starting Point
- viii. Instructor Notes - Homework
 - 1. Homework M1.1: Density

B. Student Materials – Sample Pages

- i. Nature of Matter, Student Materials – Table of Contents
- ii. Student Activities/Investigations
 - 1. Activity M1.1: Will it sink or float?
 - 2. Activity M1.4: How is density related to floating and sinking?
 - 3. Activity M3.3: What happens when water boils?
- iii. Focus on Science
 - 1. Focus on Science M1.1: Fundamental Quantities: A Starting Point

- iv. Homework
 - 1. Homework M1.1: Density

VII. Volume 5 – Motion

- A. Instructor Materials – Sample Pages
 - i. Motion, Instructor Materials – Table of Contents
 - ii. Introduction
 - iii. Student’s Notions about Motion
 - iv. Cognitive Rationale
 - v. Instructor Notes – Student Activities with Embedded Instructor Notes
 - 1. Activity M1.1: Constant motion and the first type of graph
 - 2. Activity M1.2: What difference would it make if you walked slowly, but steadily, away from the detector compared to walking faster, but steadily away from the detector?
 - 3. Activity M1.4: How would you move to exactly match the graph below?
- B. Student Materials – Sample Pages
 - i. Motion, Student Materials – Table of Contents
 - ii. Student Activities/Investigations
 - 1. Activity M1.1: Constant motion and the first type of graph
 - 2. Activity M1.2: What difference would it make if you walked slowly, but steadily, away from the detector compared to walking faster, but steadily away from the detector?
 - 3. Activity M1.4: How would you move to exactly match the graph below?

VIII. Volume 6 – Force

- A. Instructor Materials – Sample Pages
 - i. Force, Instructor Materials – Table of Contents
 - ii. Introduction
 - iii. Student’s Notions about Force
 - iv. Cognitive Rationale
 - v. Instructor Notes – Student Activities with Embedded Instructor Notes
 - 1. Activity F1.1: What do we mean by the term “Force” in this context?
 - 2. Activity F1.3: What would the forces be like on an object so that the object maintains a constant velocity?
 - 3. Activity F1.4: What would the forces be like on an object so that it maintains a constant acceleration?

B. Student Materials – Sample Pages

- i. [Force, Student Materials – Table of Contents](#)
- ii. Student Activities/Investigations
 1. [Activity F1.1: What do we mean by the term “Force” in this context?](#)
 2. [Activity F1.3: What would the forces be like on an object so that the object maintains a constant velocity?](#)
 3. [Activity F1.4: What would the forces be like on an object so that it maintains a constant acceleration?](#)