

## Scope and Sequence of *The Rainbow*: A Teacher's Guide to Its Contents

In *The Rainbow*'s two-year textbook you will find the same topics and organization that might be found in any college textbook to give comprehensive and programmatic coverage to the subject matter. It is written to a junior high school audience, not only in terms of technical content, but also in terms of writing style.

Following this introduction is a table of contents that is annotated with explanations of the subjects introduced to the student in the corresponding lessons of the text. Each text lesson corresponds to one day of reading. Each reading is short because it focuses on concepts that will be reinforced and built upon during the course of these text studies, illuminated through *The Rainbow Home Laboratory* and utilized in everyday life. It does not submerge the student in reams of facts that will soon be forgotten and that are available in any good online source. Instead, it provides exercises through which the students demonstrate their acceptance of the concepts which will be reinforced visually, tactily and kinesthetically in the laboratory exercises.

Please look up the sample lessons to get a taste of the writing style and content. We hope you will find it imaginative, humorous, and engaging, but we are sure you will find it both technically accurate and learnable. Remember, the *Teacher's Helper* is supplied with the complete set to provide answers to all of the exercises and laboratories, and to allow you to understand at a glance what the student is to have learned from the text on a given day.

The text is illustrated with high-quality, full-color photography and art work at each opening. It is self-pronouncing and has both a glossary of terms and a thorough index.

### **Physics—The Study of the Principles that Govern the Universe**

- 1: Inertia and Flying Objects (Newton's first law of motion)
- 2: Jumping Off of Asteroids in Outer Space (Newton's second and third laws of motion)
- 3: Gravity and Gravitation
- 4: Acceleration Due to Gravity
- 5: Play Ball! (Motion under two or more forces)
- 6: Making Waves (Fluid motion)
- 7: Do Something Useful! (Introduction of work)
- 8: Falling Up (Potential energy)
- 9: What's That Got to Do with Being Useful? (Energy)
- 10: The Price of Being Useful (Energy)
- 11: Hide and Seek with an Oofglork (Energy forms and transformations)
- 12: Conservation of Energy
- 13: Forces (Gravity, electromagnetism and nuclear forces formally introduced)
- 14: Electric Force (Static electricity)
- 15: To Flow or Not to Flow (Electrical current)

- 16: Electric Work (Electricity and work)
- 17: Magnetic Force (The relationship between electricity and magnetism)
- 18: What's Left? (The nuclear forces)
- 19: Count Your Many Protons (Easy particle physics and the periodic table)
- 20: The Proton Repulsion Problem (Description of the strong nuclear force)
- 21: Storing Up Energy Against the Forces (Potential energy works the same for all forces)
- 22: Artificial Forces (Comparing forces generated by us to the natural forces)
- 23: Mass-Energy (A first easy glimpse at Einstein's relativity, and an intro. to a comparison of the different types of energy in the lessons that follow)
- 24: Heat Energy
- 25: Light Energy
- 26: Light and Matter (How light interacts with matter)
- 27: Black and White (Understanding light and its absence)
- 28: Color (The physical meaning of color)
- 29: Changing the Color of an Object (Pigments)
- 30: The Science of Light Bending (Ways light can be manipulated)

### **Chemistry—A Study of Substances, Their Properties, and Their Interactions**

- 1: Impress Your Friends! (An introduction to arouse the student's interest in chemistry)
- 2: Packaging Stuff (An introduction to the basic properties of matter, beginning with an intuitive definition of solids, liquids and gases—phases of matter)
- 3: How Much Stuff is in Stuff? (An intuitive definition of mass)
- 4: Properties of Matter: Density (An intuitive definition of density)
- 5: The Elemental World (A world without chemical reactions)
- 6: Chemical Bonding (Chemical bonding and attraction—an intuitive approach to the definition of a chemical reaction)
- 7: Properties of Elements (How the periodic table helps us to understand the elements and their reactions)
- 8: Then What is a Metal? (Properties of metals)
- 9: Molecular Weight (The mass of a molecule is equal to the sum of the mass of its atoms—an intuitive illustration)
- 10: How Can I Get a Reaction? (How the periodic table can be used to predict a reaction)
- 11: Reactions Between Compounds (A second kind of chemical reaction)
- 12: Atomic Gangs (Groups of atoms that act like a separate element)
- 13: Why Do We Care About Chemical Reactions Anyway? (A reminder of the practical importance of these studies)
- 14: Carbon Chemistry (A simple introduction—definition and description—to the broad field of organic chemistry)
- 15: Fueling Reactions (A description of how energy is derived from the breaking of chemical bonds, and info about where different fuels come from)
- 16: People Chemistry (How people get their energy from chemicals)
- 17: More People Chemistry (More about how food is used for energy)
- 18: The Molecules of Life: Nucleic Acids (Introducing the basic molecules that make up living things beginning with the genetic code)
- 19: The Molecules of Life: Proteins

- 20: The Molecules of Life: Polysaccharides
- 21: The Molecules of Life: Lipids and Others
- 22: Solutions (Water chemistry with emphasis on its interactions with solid chemicals)
- 23: Solubility (Understanding what will or will not dissolve in what)
- 24: Suspensions (Undissolved solid in liquid)
- 25: The Pain of Suspensions (The practical problems that may be caused by suspended matter)
- 26: Water as a Protector of Life (The chemical design of this most important molecule and how it allows life to exist)
- 27: Saved by Water (Water protects living things from the universe's physical environment)
- 28: Acids and Bases (What are acids and bases?)
- 29: Don't Say pHooey (A simple introduction to the measure of acidity and basicity called pH)
- 30: Thermo-dy-whatchacall-your-namics (Why some reactions take place and others do not)
- 31: Heat-Producing and Heat-Robbing Reactions (What reactions do to the energy balance of their surroundings)
- 32: Kinetics (How fast will a particular reaction take place?)

### **Biology—The Study of Life and Living Things**

- 1: So What's Life? (Defining life and placing science in perspective with the Christian religion)
- 2: Organization in Living Things
- 3: It's a What-cha-ma-callit (Naming living organisms)
- 4: Cells (The basic unit of scientific "life")
- 5: Cell Accessories (Differences among cells of different organisms)
- 6: The Great Debate (An overview of the debate on the origin of life: the evolutionary bias)
- 7: Bang? (Christian perspective on the origin of the universe)
- 8: Abiogenesis (Christian perspective on the origin of life; based on our knowledge of physics and chemistry, the unlikelihood of life arising from non-life by purely physical processes)
- 9: Making You Out of Apes? (Christian perspective on the origin of humans)
- 10: Adaptive Evolution (What has been observed that may rightly be called "evolution")
- 11: The World of Microbes (A survey of living things beginning with the simplest organisms)
- 12: Botany (Plants)
- 13: The Tiny Plants
- 14: Up the Plant Ladder
- 15: Higher Plants—Non-Flowering Plants
- 16: Higher Plants—Flowering Plants
- 17: The Animals
- 18: Phyla of the "Changed Animals" (Animals of increasing complexity)
- 19: Does Your Body Have Cavities?
- 20: You're Nowhere Without Joints in Your Legs!
- 21: Mandibulates
- 22: You'd Walk Slowly Too if You Had Tube Feet
- 23: Fishlike Animals with Cords
- 24: Slimy or Not, Mom Still Despises You
- 25: Up, Up and Away
- 26: You Big Hairy Animal!
- 27: Miscellaneous Little Fuzzy Things

- 28: Was Jonah Swallowed by a Mammal?
- 29: I Wouldn't Say You're a Dog, But You're Still Ugly!
- 30: You and Me, Baby
- 31: Them Bones, Them Bones (Survey of human systems beginning with the skeletal system)
- 32: Muscles
- 33: Digestive System
- 34: Respiratory System
- 35: The Urinary System
- 36: The Race for the Egg (Fertilization)
- 37: Circulatory, Lymphatic and Immune Systems
- 38: You Are a Bundle of Nerves (The nervous system)
- 39: Genetics
- 40: Ecology (Interactions among organisms and their environments)
- 41: Food Web
- 42: Can We Get Along?
- 43: Population Dynamics

### **Applications of the Rainbow**

- 1: Scientific Method (Theory, hypothesis, testing, controls, objectivity and conclusions)
- 2: The Earth (Composition and characteristics of our planet)
- 3: Earth Tantrums (Earthquakes and volcanoes)
- 4: Collections of Water (How bodies of water form and remain)
- 5: Big Collections of Water (The world's ocean)
- 6: The Greenhouse Effect (Protection we receive from our atmosphere)
- 7: Geology (The science of the earth's composition; a Christian perspective on the age of the earth: seeing versus assuming)
- 8: How to Make Soil (Erosion and the weathering of rock)
- 9: Water in the Soil (Ground water)
- 10: Atmospheric Science (Description of the various zones of our atmosphere)
- 11: Meteorology and Climatology (The difference between weather and climate)
- 12: Stirring the Atmospheric Pot (The first of several lessons on how the physical forces act on the world's matter to give us climate and control our weather)
- 13: Bringing Order to Mixed Fluid
- 14: Atmospheric Currents
- 15: What the Currents Do to Climate
- 16: The Ever-Changing Weather
- 17: Clouding the Issue (Know your clouds)
- 18: Leaving Earth—Our Solar System (The planets and their characteristics)
- 19: Sun and Earth (The earth's motions in relationship to the sun and its effects on the seasons)
- 20: Far Away From Home (Outer space and the universe)

## The Rainbow Home Laboratory: Scope and Sequence

The crown jewel of *The Rainbow* curriculum is its laboratories. There students will unforgettably demonstrate for themselves the reality of the concepts taught in the textbook. Home schooling is uniquely suitable for these “A-ha!” experiences and *The Rainbow Home Laboratory* is uniquely designed around the home school environment. Every laboratory is completely provided for in the accompanying laboratory kit. The following is a list of the lab titles along with brief explanations of the concepts they illuminate.

### Red Section

- 1: Crummy Marble (introduction to the effects of gravity on matter)
- 2: Acceleration
- 3: Motion (linear, curved, orbital, wave)
- 4: Energy and Work
- 5: Transfer of Energy
- 6: Devices for Changing Forms of Energy
- 7: Electric Heads (static electricity and current)
- 8: Magnetism: Force, Work, Energy and Field
- 9: Magnetism and Electricity (electromagnets and generators)
- 10: The Elements (atomic theory)
- 11: Fluid Properties (intermolecular forces and fluids)
- 12: Heat (An exploration of heat and its effects on matter.)
- 13: Light Bending (uses of the refractive property of light)
- 14: Color (exercises in light reflection and absorption)
- 15: Review

### Yellow Section

- 1: Phase Changes (states of matter)
- 2: Density
- 3: The Periodic Table (exercises in understanding and familiarity)
- 4: Chemical Bonds and Compounds (building models of molecules)
- 5: Chemical Reactions, Part I: A Model Reaction (chemical reactions using model molecules)
- 6: Chemical Reactions, Part II: Atoms In = Atoms Out (the concept of mass balance)
- 7: Chemical Reactions, Part III: Balancing Chemical Equations (writing mass balances in equation form)
- 8: Chemical Reactions, Part IV: Fueling Reactions (the chemistry of burning fossil fuels)
- 9: Chemical Reactions, Part V: Oxidation (and reduction)
- 10: Biochemical Treasure Hunt (exercise in familiarity with biochemicals)

- 11: Solutions and Solubility (the chemical basis for solubility)
- 12: Suspensions (and separation techniques)
- 13: Water and Temperature (evaporative cooling)
- 14: Acid/Base Reactions (and acid/base neutralization)
- 15: Thermodynamics and Kinetics (heat evolution and absorption from chemical reactions; reaction spontaneity)
- 16: Review

### **Blue Section**

- 1: Do You Really Drink That Stuff (bacteriology of drinking water)
  - 2: The Classification Game (using keys to classify organisms)
  - 3: Little Green Guys (algae)
  - 4: Hay “Fever” (protozoa)
  - 5: Fungi Amongi? (fungi)
  - 6: Monowhatyledon? (growing plants for later lab in fundamental plant classification)
  - 7: Cheeky Cells (observation of cells)
  - 8: Fruits and Vegetables (gymnosperm seeds and flower anatomy)
  - 9: Floral Surgery (angiosperm flower dissection)
  - 10: Plant Taxonomy
  - 11: Review I
  - 12: Vermatomy (earthworm dissection)
  - 13: The Naming of Parts (diagrammatic survey of human anatomy)
  - 14: Where Do They Fit? (flash card game on animal taxonomy)
- Science in the Field (a series of outdoor labs to do throughout the school year)
- 15: Hugo Czechemov (find and identify one plant from each major classification)
  - 16: Hugo Czechemov (continued)
  - 17: Hugo Czechemov II (find and identify one animal from each major classification)
  - 18: Hugo Czechemov II (continued)
  - 19: One-Day Insect Extravaganza (different methods of collecting insects)
  - 20: I’ve Got a Niche (study of the environmental range of an organism)
  - 21: Review II

### **Rainbow Section**

- 1: Hypothesis Testing (a true scientific experiment)
- 2: Popsicles of Paris and Portland (physical properties of construction materials)
- 3: How Salty is the Ocean? (creation and use of our own device for measuring salinity of water by its density)
- 4: Crystal City (making crystals)
- 5: Ground Water Chemistry (effects of acid on mineral dissolution underground)
- 6: Smokehouse (observing airflow patterns in a room)
- 7: The Science of Comfort (temperature, humidity and comfort index)
- 8: Bottled Water Vapor (evaporation and condensation)
- 9: Seeing Stars (family stargazing)
- 10: Review

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