



# reader's guide

*Experiment Central: Understanding Scientific Principles Through Projects* provides in one resource a wide variety of science experiments covering nine key science curriculum fields—Astronomy, Biology, Botany, Chemistry, Ecology, Food Science, Geology, Meteorology, and Physics—spanning the earth sciences, life sciences, and physical sciences.

*Experiment Central*, Volumes 5 and 6, a continuation of U•X•L's four-volume base set, presents fifty-four new experiments and projects for students in twenty-seven subject-specific chapters. Chapters, each devoted to a scientific concept, include: Air and Water Pollution, Caves, DNA, Fungi, Periodic Table, Storms, and Time. Two experiments or projects are provided in each chapter.

## **Entry format**

Chapters are arranged alphabetically by scientific concept and are presented in a standard, easy-to-follow format. All chapters open with an explanatory overview section designed to introduce students to the scientific concept and provide the background behind a concept's discovery or important figures who helped advance the study of the field.

Each experiment is divided into eight standard sections designed to help students follow the experimental process clearly from beginning to end. Sections are:

- Purpose/Hypothesis
- Level of Difficulty
- Materials Needed
- Approximate Budget
- Timetable
- Step-by-Step Instructions
- Summary of Results
- Change the Variables

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Each chapter also includes a “Design Your Own Experiment” section that allows students to apply what they have learned about a particular concept and to create their own experiments. This section is divided into:

- How to Select a Topic Relating to this Concept
- Steps in the Scientific Method
- Recording Data and Summarizing the Results
- Related Projects

Concluding all chapters is a “For More Information” section that provides students with a list of books and Web sites with further information about that particular topic.

### Special Features

- A “**Words to Know**” section runs in the margin of each chapter providing definitions of terms used in that chapter. Terms in this list are bolded in the text upon first usage. A cumulative glossary collected from all “Words to Know” sections in the twenty-seven chapters is included in the beginning of each volume.
- **Experiments by Scientific Field** index categorizes experiments by scientific curriculum area. This index cumulates all 154 experiments across the six-volume series.
- **Parent’s and Teacher’s Guide** recommends that a responsible adult always oversees a student’s experiment and provides several safety guidelines for all students to follow.
- Standard sidebar boxes accompany experiments and projects:
  - “**What Are the Variables?**” explains the factors that may have an impact on the outcome of a particular experiment.
  - “**How to Experiment Safely**” clearly explains any risks involved with the experiment and how to avoid them. While all experiments have been constructed with safety in mind, it is always recommended to proceed with caution and work under adult supervision while performing any experiment (please refer to the Parent’s and Teacher’s Guide on page xv).
  - “**Troubleshooter’s Guide**” presents problems that a student might encounter with an experiment, possible causes of the problem, and ways to remedy the problem.
- Approximately **80 photographs** enhance Volumes 5 and 6.

- Approximately **170 drawings** illustrate scientific concepts and specific steps in the experiments, helping students follow the experimental procedure.

Four indexes, which cumulate all 154 experiments across the six-volume series, conclude each volume:

- **Budget Index** categorizes experiments by approximate cost. Budgets may vary depending on what materials are readily available in the average household.
- **Level of Difficulty Index** lists experiments according to “Easy,” “Moderate,” “Difficult,” or a combination thereof. Level of difficulty is determined by such factors as the time necessary to complete the experiment, level of adult supervision recommended, and skill level of the average student. Level of difficulty will vary depending on the student. A teacher or parent should always be consulted before any experiment is attempted.
- **Timetable Index** categorizes each experiment by the time needed to complete it, including setup and followthrough time. Times given are approximate.
- **General Subject Index** provides access to all major terms, people, places, and topics covered in *Experiment Central*.

### **Acknowledgments**

A note of appreciation is extended to the *Experiment Central* advisors, who provided their input when this work was in its formative stages:

Teresa F. Bettac  
Middle School Advanced Science Teacher  
Delaware, Ohio

Linda Leuzzi  
Writer, Trustee of The Science Museum of Long Island

David J. Miller  
Director of Education

The Science Museum of Long Island

The author also wishes to acknowledge and thank Joyce Katz, Cindy O’Neil, and Alana Brette Nelson for their contributions to the experiments in Volumes 5 and 6, as well as science copyeditor Chris Cavette and illustrator Temah Nelson for their contributions to *Experiment Central*, Volumes 5 and 6.

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**Comments and Suggestions**

We welcome your comments on *Experiment Central*. Please write: Editors, *Experiment Central*, U•X•L, 27500 Drake Rd., Farmington Hills, Michigan, 48331-3535; call toll free: 1-800-877-4253; fax: 248-699-8097; or send e-mail via <http://www.gale.com>.

# experiments by scientific field

Chapter name in brackets, followed by experiment name; *italic* type indicates volume number, followed by page number; **boldface** volume numbers indicate main entries in *Experiment Central*, Volumes 5 and 6.

## **Astronomy**

- [Comets and Meteors] Comet Nucleus: Linking a comet's composition to its properties. . . . . **5**: 123
- [Comets and Meteors] Meteor Impact: How do the characteristics of a meteorite and its impact affect the shape of the crater? . . . . . **5**: 126
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- [Eclipses] Phases of the Moon: What does each phase look like? . . . . . *1*: 181
- [Rotation and Orbits] Foucault Pendulum: How can a pendulum demonstrate the rotation of Earth? . . . . . **6**: 355
- [Rotation and Orbits] Spinning Effects: How does the speed of a rotating object affect the way centrifugal force can overcome gravity? . . . . . **6**: 360
- [Space Observations] Telescopes: How do different combinations of lenses affect the image? . . . . . **6**: 435
- [Space Observations] Doppler Effect: How can waves measure the distance and speed of objects? . . . . . **6**: 440
- [Stars] Tracking Stars: Where is Polaris? . . . . . *4*: 606

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[Enzymes] Tough and Tender: Does papain speed up the  
aging process? . . . . . 2: 224

[Fungi] Decomposers: Food source for common fungi . . . . . 5: 238



# words to know

## A

**Absolute dating:** The age of an object correlated to a specific fixed time, as established by some precise dating method.

**Acceleration:** The rate at which the velocity and/or direction of an object is changing with respect to time.

**Additive:** A chemical compound that is added to foods to give them some desirable quality, such as preventing them from spoiling.

**Air:** Gaseous mixture that envelopes Earth, composed mainly of nitrogen (about 78 percent) and oxygen (about 21 percent) with lesser amounts of argon, carbon dioxide, and other gases.

**Air density:** The ratio of the mass of a substance to the volume it occupies.

**Air mass:** A large body of air that has similar characteristics.

**Air pressure:** The force exerted by the weight of the atmosphere above a point on or above Earth's surface.

**Alkali metals:** The first group of elements in the periodic table, these metals have a single electron in the outermost shell.

**Alkaline:** A substance that is capable of neutralizing an acid, or basic. In soil, soil with a pH of more than 7.0, which is neutral.

**Amino acids:** The building blocks of proteins.

**Angiosperm:** A flowering plant, which has its seeds produced within an ovary.