Program Features

Frey's Inquiry Investigations™ *Module Environmental Issues and Solutions* engages your students in active and meaningful learning. Each of the four units in the program focuses on a different theme and contains an exciting collection of classroom-tested activities that let students experience the wonders of science through direct, hands-on experience.

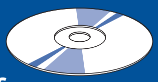
These standards-based units link to core science concepts, making them an excellent complement to your existing curriculum. Best of all, you won't need a strong background in science to use this program—the comprehensive Curriculum Guide that comes with the module provides teacher-friendly instructions on how to teach the activities.

Each Unit includes

- Comprehensive investigation literature with planning and preparation tips, step-by-step instructions, expected outcomes, cross-curricular integration, and assessment strategies.
- A reproducible Student Guide for each unit with complete background information, step-by-step procedures, data tables, analysis questions, and options for open-ended student-designed investigations that challenge students to use their critical thinking skills. Also included are related websites and *Read More About It* sources for students to obtain additional information.
- A collection of safe and fun inquiry-based lab investigations with real-world applications.
- Enough high-quality science materials for a class of up to 40 students working in groups.
- A handy Storage Center to neatly store all materials.

The Curriculum Guide includes

- Comprehensive, unit-specific teacher and student guides.
- Materials lists, a comprehensive Glossary, Useful Equivalents, Symbols, and Equations, Science Safety, and How to Record, Analyze, and Report Data.
- Three Comprehensive Inquiry Activities—Modeling a Water Treatment Plant, Biological Treatment of Pollution, and Evaluating the Health of an Ecosystem.



Also included with the Inquiry Investigations™ Module *Environmental Issues and Solutions* is the Curriculum Resource CD-ROM*, which includes…

Content Tutorials:

- Topic-related content featuring detailed illustrations that cover key concepts in environmental science.
- Hyper-linked glossary of key concepts and terms.

Assessment Monitoring:

- Test questions that can be accessed in either Practice or Test Mode; questions allow students to demonstrate content knowledge.
- Customized tests and worksheets with five question types (essay, multiple choice, concept map, matching, and labeling), as well as dynamic web-deliverable multi-media tutorials and presentations.

Correlation to National and State Science Standards:

- Key concepts correlated to the National Science Education Standards (NSES) and a link to the Frey Scientific website for selected State standards.

Teacher Resources:

- Image gallery containing printable illustrations and images relating to an ecology topic area.
- Dynamic animations that reinforce key concepts in ecology.
- Experimental results section that provides useful teacher tips for each activity as well as in-depth experimental data analysis. Where applicable, graphs, tables, and images are provided to enhance each activity.

Virtual Laboratory—The Effect of Temperature on Dissolved Oxygen

- Explore the object-based virtual lab environment. The virtual lab allows students to interactively perform every step of each lab activity by manipulating lab equipment on their virtual workbench.
- Use the electronic notebook to record and analyze results.

**System Requirements: Windows 2000 or higher, VISTA-compatible, Mac 9.2 or higher (including OSX), 128 MB RAM.*

The Curriculum Guide contains the following sections – Teacher Guide, Appendix, Student Resources, and a Curriculum Resource CD-ROM. Each section has the same general format, let's take a closer look –

A Closer Look at the Teacher Guide…

Science Concepts and Skills

- Overview of key concepts and skills presented in each lab

Science Standards

- A list of the National Science Education Standards covered in each lab

Materials

- Comprehensive list of the materials needed for each lab

Safety and Disposal

- Tips for safe disposal of waste materials and student safety

Curriculum Resource CD-ROM

- Additional resources found on the Curriculum Resource CD-ROM

Time Requirements

- Amount of time needed for preparation and activities

Pre-lab Preparation

- Overview of any necessary pre-lab preparation

Teacher Guide

Science Concepts and Skills

- Microorganisms
- Biodegradation
- Open landfills
- Sanitary landfills
- Methane gas
- Recycling
- Refuse

National Science Standards

Standard A – Science as Inquiry

A1 Identify questions that can be answered through scientific investigations
A2 Design and conduct a scientific investigation
A3 Use appropriate tools and techniques to gather, analyze, and interpret data
A4 Develop descriptions, explanations, predictions, and models using evidence
A5 Think critically and logically to make the relationships between evidence and explanations
A6 Recognize and analyze alternative explanations and predictions
A7 Communicate scientific procedures and explanations
A9 Understandings about scientific inquiry

Standard C – Life Science

E3 Implement a proposed design
E6 Understandings about science and technology

Standard F – Science in Personal and Social Perspectives

F2 Populations, resources, and environments
F3 Natural hazards
F5 Science and technology in society

Safety and Disposal

Instruct students to follow proper lab safety techniques. Have students wear safety goggles, gloves, and a lab apron to protect eyes and clothing when working with the soil or chemicals. Students should use extreme caution when working around a Bunsen burner. Be sure to help students light the Bunsen burner and adjust the air and gas flow. Remind students to keep their hands away from their face or mouth.

Liquid materials may be flushed down the drain with copious amounts of water. Solid materials may be disposed of in the trash.

Curriculum Correlation

See the *Curriculum Resource CD-ROM* for a correlation to the National Science Education Standards (NSES). Visit the Frey Scientific website (**www.freyscientific.com/inquiryinvestigations**) for selected state correlations.

See the **Curriculum Resource CD-ROM** to…

- Prepare web deliverable content
- Create assessment questions
- Explore a virtual lab
- View content tutorials
- Learn about experimental results
- Link key science concepts to selected State and National Standards

Teacher Guide

Lab Materials List

10	Bags, resealable, small (3" × 5")
10	Bottles, spray
10	Containers, plastic
1	Cover slips, p/100
1	Cup, Styrofoam
20	Discs, opaque, blue
10 pr.	Forceps
70	Labels, plastic, plant
1	Loeffler's methylene blue stain, bottle/30 mL
10	Magnifying glasses
1	Microbial mixture, 1 oz
1	Microscope slides, glass, p/72
10	Pencils, wax
10	Petri plates
1	Soil, p/3 lbs
1	String, cellulose, 2 ft
1	String, nylon, 2 ft
1	String, yarn, 2 ft
1	Trowel, small

Teacher-Provided Items

	Aprons (per student)
1	Bucket, 5 gallon
1	Bunsen burner
10	Clothespins
	Gloves (per student)
10	Microscopes, compound light
1	Paper, sheet
1	Paper towel, roll
	Safety goggles (per student)
1 pr.	Scissors
	Water, distilled or bottled

Time Requirements

Activity 1: Biodegradation in a Landfill	
Pre-lab Preparation:	20 minutes
Activity:	30 minutes for setup
	6–8 weeks incubation
	45 minutes analysis

Pre-lab Preparation

Activity 1

Enough materials are provided for a class of forty students working in 10 groups of four. Divide your class into groups accordingly.

You will need to cut each of the following items into 20 small pieces:

String, yarn
String, nylon
String, cellulose
Paper, sheet
Styrofoam cup

Each piece should be no larger than one inch. Place two pieces of each item along with two blue opaque plastic discs, in each of 10 bags. Distribute a bag to each group.

Place 6 lbs of soil in a 5 gallon bucket. Add 1 oz of microbial mixture to the soil. Use the trowel provided to mix the components together. Leave the trowel in the bucket and place the bucket at a central location so that it is easily accessible by the students.

When it is time to analyze the samples, set up a Bunsen burner in an area of the lab that is easily accessible to students.

Unit 1 | Lab 1: Landfills 23

A Closer Look at the Teacher Guide…

Objective

- Specific student goals of the activity

What you need

- Specific materials used in each activity

What to do

- Teacher friendly step-by-step procedures for each activity

Recording Observations

- Sample student data for each activity

Questions

- Questions to assess student understanding of the activity

Safety and Disposal

- Important safety information specifically related to each activity

Cross-Curricular Integration

- Suggestions of how to relate the key concepts of the lab to other disciplines

Extensions and Challenges

- Additional activity suggestions to reinforce the key concepts presented in the lab

---

Teacher Guide

ACTIVITY 1

Biodegradation in a Landfill

Objective

In this activity, students will build a model landfill and determine which materials are most likely to biodegrade.

What you need

Per Group

1 Bag, resealable, containing 2 pieces each of cellulose string, nylon string, yarn string, Styrofoam, paper, and blue plastic opaque discs
1 Bottle, spray
1 Clothespin
1 Container, plastic
4 Cover slips
1 pr. Forceps
7 Labels, plastic, plant
1 Magnifying glass
1 Microscope, compound light
4 Microscope slides, glass
1 Pencil, wax
1 Petri plate

Per Class

1 Bunsen burner
1 Loeffler's methylene blue stain, bottle/30 mL
1 Paper towel, roll
1 Soil mixed with microbial mixture, 6 lbs
1 Trowel, small
Water, distilled or bottled

Per Student

1 Apron
1 pr. Gloves
1 pr. Safety goggles

Safety and Disposal

Instruct students to follow proper lab safety techniques. Have students wear safety goggles, gloves, and a lab apron to protect eyes and clothing when working with the soil or chemicals. Students should use extreme caution when working around a Bunsen burner. Be sure to help students light the Bunsen burner and adjust the air and gas flow. Remind students to keep their hands away from their face or mouth.

Liquid materials may be flushed down the drain with copious amounts of water. Solid materials may be disposed of in the trash.

What to do

STEP 1

Have students read the *Background* information in the *Student Guide*.

STEP 2

At a central distribution station, have students use the trowel to add enough soil to the bottom of their plastic containe… of soil. Ha… out the b…

STEP3

Have stu… bag. They… materials… istics and… use the fo… rity of ea…

0 = Stron…
1 = Starti…
2 = Mode…
3 = Extre…

Have stu… #1 in the…

Teacher Guide

Extensions and Challenges

Have students investigate the role decomposer microbes in the soil play in the carbon cycle.

Have students repeat the activity using different sample waste materials. Have students also expose the model landfill to different temperatures, such as a freezer, to replicate the four seasons.

Have students investigate how gases produced from decomposition by microbes in landfills are being harnessed and used to generate electricity.

Cross-Curricular Integration

Social Studies

Discuss with your students the benefits and drawbacks of landfills, as well as other disposal methods of refuse, such as recycling, composting, incineration, and ocean dumping. Have your students investigate and debate the cost of each, their associated environmental impact, and energy requirements.

…riculum Resource CD-ROM to…
…cience concepts to …tate and National
…eb deliverable content …virtual lab

…l Issues and Solutions

Teacher Guide

Recording Observations

Data Table #1

Sample	Observations
Degraded oil	Cloudy, highly textured, dispersed into fine droplets, surrounded by bacteria
Untreated oil	Smooth, free-flowing, clear

Questions

Use the following questions to assess student understanding of the concepts introduced in the activity.

1. **Compare the appearance of the degraded oil with the appearance of the untreated oil.**
   The degraded oil is cloudy and consists of fine droplets. The untreated oil is smooth and clear.
2. **Why do you suppose the degraded oil sample looks the way it does?**
   The bacteria have started to break down the oil, causing it to form clumps.
3. **How do you suppose the degraded oil sample would look if the bacteria completely degraded the oil?**
   There wouldn't be any droplets of oil in the sample. It would look like a cloudy liquid with lots of bacteria in it.
4. **What can scientists find out by microscopically examining oil samples from an actual oil spill that is being cleaned up with microorganisms?**
   Scientists can examine oil samples with microscopes to see if the oil is being broken into fine drops. They can see if bacteria are still present (alive). They can use their observations to determine if any adjustments need to be made in the bioremediation process.
5. **What do you think would be the effect of spraying an oil-contaminated beach with nutrients? Explain.**
   The oil on the beach would probably be degraded faster because the nutrients would make the bacteria grow and reproduce faster.

See the **Curriculum Resource CD-ROM** to…
- Learn more about experimental results and useful teacher tips
- Enhance each activity by accessing graphs, tables, and images

See the **Curriculum Resource CD-ROM** to…
- Create more assessment questions
- Customize worksheets and tests with five question types (essay, multiple choice, concept map, matching, and labeling)

A Closer Look at the Appendix…

Laboratory Notebook

- Useful tips on how to record, organize, and understand data

The Laboratory Notebook: Recording, Analyzing, and Reporting Data

Data sets are unbiased information gathered through the scientific process that can lead to knowledge and understanding. To be useful, data must be recorded, organized, graphed, analyzed, and reported.

Recording Data

Science deals with verifiable observations. All scientists must keep clear and accurate records of their observations. It is critical that these notebook recordings are made at the time of observation.

Recording data can be done manually through the reading of an instrument, such as a thermometer, and writing down measurements in a lab notebook or data book. Some data measurement probes and instruments (temperature, balance, pH, dissolved oxygen to name a few) can sample and transmit data to a computer for storage in a data table.

At times, your investigation may require the use of a video or photo camera to record visual information. Try to include some dimensional reference (a ruler or other feature) in your shots to provide the correct perspective. Digital photo cameras and scanners allow an investigator to capture experimental results.

Organizing Data

Make sure data sets are presented in tables listed in correct relation to each other. Sometimes your investigations may call for the collection of very large data sets. One way to manage this pile of data is through a database—a large, complex list of facts and information. A database can be a card file or an electronic program that can both recall and merge data. FileMaker Pro (by FileMaker, Inc) or Excel (by Microsoft) are powerful database programs that combine database management and desktop-to-Web network publishing

reproducibility of a result. For example, if you measure a quantity several times and the values agree closely with one another, your measurement is precise. Accuracy describes how close a measured value is to the true or known value. The closer a measured value is to the true value, the more accurate it is. Let's investigate this further.

For example, examine the data sets below.

Procedure 1:	20.1
	20.1
	20.2
	20.0
Procedure 2:	24.5
	25.6
	26.1
	25.1

If the true value is 25.3, then data collected from procedure 2 is more accurate but less precise than the data collected from procedure 1. In this case the precision is poor but the accuracy is good. An ideal procedure is both accurate and precise.

Data Books

The best method of record-keeping is to record observations in a laboratory notebook or data book. Ideally, this should be a stiff-covered book, permanently bound, not loose-leaf, preferably with square grid pages.

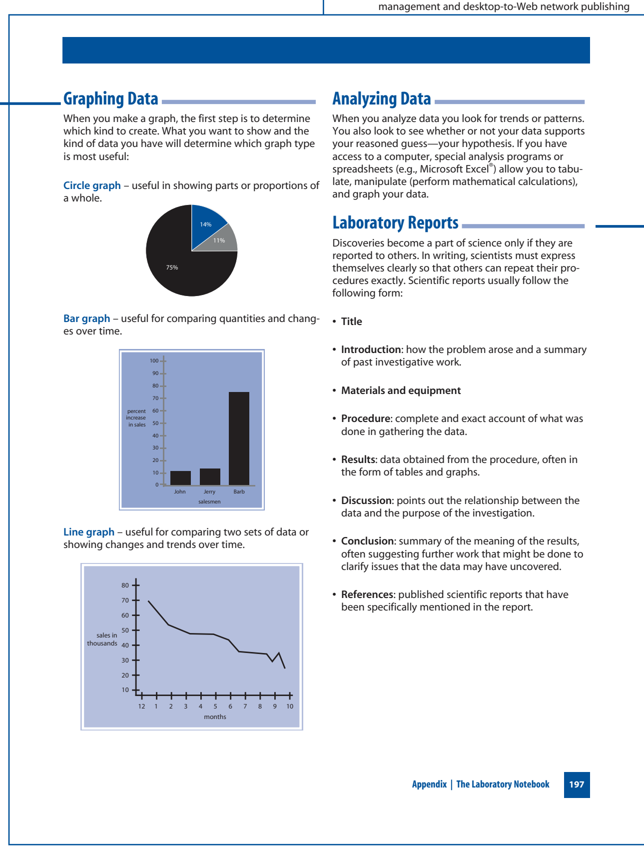
Keep records in a diary form, recording the date first. If you make observations for two or more investigations on the same day, use numbers or abbreviations of the titles as subheadings.

Data may be recorded as words. In the laboratory, time is short. Make notes as brief as possible—but to the point. You may choose to sketch your observations. Drawings, digital images, and digital video are all useful data recording techniques.

ns

Graphing Data

- Examples of ways to graphically present data



Graphing Data

When you make a graph, the first step is to determine which kind to create. What you want to show and the kind of data you have will determine which graph type is most useful:

Circle graph – useful in showing parts or proportions of a whole.

Bar graph – useful for comparing quantities and changes over time.

Line graph – useful for comparing two sets of data or showing changes and trends over time.

Analyzing Data

When you analyze data you look for trends or patterns. You also look to see whether or not your data supports your reasoned guess—your hypothesis. If you have access to a computer, special analysis programs or spreadsheets (e.g., Microsoft Excel®) allow you to tabulate, manipulate (perform mathematical calculations), and graph your data.

Laboratory Reports

Discoveries become a part of science only if they are reported to others. In writing, scientists must express themselves clearly so that others can repeat their procedures exactly. Scientific reports usually follow the following form:

- **Title**
- **Introduction**: how the problem arose and a summary of past investigative work.
- **Materials and equipment**
- **Procedure**: complete and exact account of what was done in gathering the data.
- **Results**: data obtained from the procedure, often in the form of tables and graphs.
- **Discussion**: points out the relationship between the data and the purpose of the investigation.
- **Conclusion**: summary of the meaning of the results, often suggesting further work that might be done to clarify issues that the data may have uncovered.
- **References**: published scientific reports that have been specifically mentioned in the report.

Appendix | The Laboratory Notebook 197

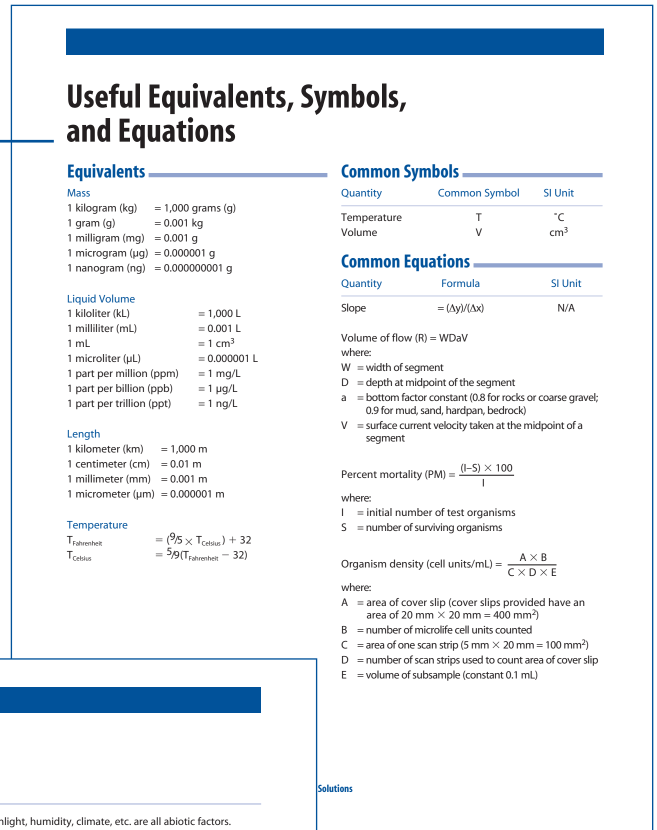
Laboratory Reports

- General outline for scientific reports

A Closer Look at the Appendix…

Useful Equivalents, Symbols, and Equations

- Quick reference guide of common conversions, symbols, and equations



Useful Equivalents, Symbols, and Equations

Equivalents

Mass

1 kilogram (kg)	= 1,000 grams (g)
1 gram (g)	= 0.001 kg
1 milligram (mg)	= 0.001 g
1 microgram (µg)	= 0.000001 g
1 nanogram (ng)	= 0.000000001 g

Liquid Volume

1 kiloliter (kL)	= 1,000 L
1 milliliter (mL)	= 0.001 L
1 mL	= 1 cm^3
1 microliter (µL)	= 0.000001 L
1 part per million (ppm)	= 1 mg/L
1 part per billion (ppb)	= 1 µg/L
1 part per trillion (ppt)	= 1 ng/L

Length

1 kilometer (km)	= 1,000 m
1 centimeter (cm)	= 0.01 m
1 millimeter (mm)	= 0.001 m
1 micrometer (µm)	= 0.000001 m

Temperature

$T_{Fahrenheit} = (9/5 \times T_{Celsius}) + 32$

$T_{Celsius} = 5/9(T_{Fahrenheit} - 32)$

Common Symbols

Quantity	Common Symbol	SI Unit
Temperature	T	°C
Volume	V	cm^3

Common Equations

Quantity	Formula	SI Unit
Slope	= (Δy)/(Δx)	N/A

Volume of flow (R) = WDaV

where:

W = width of segment

D = depth at midpoint of the segment

a = bottom factor constant (0.8 for rocks or coarse gravel; 0.9 for mud, sand, hardpan, bedrock)

V = surface current velocity taken at the midpoint of a segment

Percent mortality (PM) = $\frac{(I-S) \times 100}{I}$

where:

I = initial number of test organisms

S = number of surviving organisms

Organism density (cell units/mL) = $\frac{A \times B}{C \times D \times E}$

where:

A = area of cover slip (cover slips provided have an area of 20 mm × 20 mm = 400 mm^2)

B = number of microlife cell units counted

C = area of one scan strip (5 mm × 20 mm = 100 mm^2)

D = number of scan strips used to count area of cover slip

E = volume of subsample (constant 0.1 mL)

Solutions

Glossary

- Comprehensive glossary of key terms

Glossary

A

Abiotic Nonliving components of an ecosystem; wind, sunlight, humidity, climate, etc. are all abiotic factors.

Acid rain Precipitation containing acids that form in the atmosphere when industrial gas emissions (especially sulfur dioxide and nitrogen oxides) combine with water.

Aeration The addition of air to water; oxygen is added to a sample.

Air pollution Harmful chemical vapor, particulate, or biological agent in the atmosphere.

Anaerobic decomposition Microbial process involving the breakdown of organic materials in the absence of oxygen.

Aquatic toxicology The study of the effects of environmental contaminants on aquatic organisms.

Atmosphere The entire mass of gases surrounding Earth.

Atom The smallest particle of an element that still has all the properties of that element.

Autotroph An organism that makes its own food from inorganic components. Plant, algae, and some bacteria are examples.

B

Bedrock The solid rock that underlies loose material, such as soil, sand, clay, or gravel.

Bioassay (Biological assay) A measure of biological activity. Qualitative bioassays are used for assessing the physical effects of a substance that may not be quantified, such as abnormal development or deformity. Quantitative bioassays involve estimation of the concentration or potency of a substance by measurement of the biological response that it produces.

Biodegradation The breakdown of complex compounds into simpler compounds by the actions of living organisms (typically microorganisms).

Biodiversity The number of different species of organisms in an environment.

Biogeochemical cycling The chemical interactions that exist between the atmosphere, hydrosphere, lithosphere, and biosphere.

Biological assessment The collection and analysis of environmental data to make a determination of appropriate steps to take to mitigate a problem.

Biological community All the organisms (plants, animals, bacteria, etc.) that live in an area and interact with each other.

Biological indicator A living organism or chemical compound made by a living organism that is used to monitor the health of an environment or ecosystem.

Biomass The total mass of living matter within a given unit of environmental area.

Biome A major ecological community (e.g., tundra or desert).

Bioremediation The use of biological agents, such as bacteria or plants, to remove or neutralize contaminants, as in polluted soil or water.

Biosphere Parts of the land, sea, and atmosphere in which organisms are able to live. It is an irregularly shaped, relatively thin zone in which life is concentrated on or near Earth's surface and throughout its waters.

Biotic All of the living organisms in an ecosystem.

226 Inquiry Investigations Module: Environmental Issues and Solutions

A Closer Look at the Student Guide…

Objectives

- Key concepts and student goals for the lab

Background

- Science information related to the lab topic

What to do

- Step-by-step procedures for each activity

Student Guide

INQUIRY INVESTIGATIONS LAB

NAME
TEACHER
DATE

Unit 1 | Lab 2

Radiation Effects

WARNING — This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

Objectives

- **Identify the effect of ionizing radiation on DNA.**
- **Determine percent germination and mortality rates of seeds that have been exposed to varying levels of radiation.**
- **Compare the growth and development of plants from irradiated seeds.**

Safety and Disposal

Follow proper lab safety techniques as directed by your teacher. Wear safety goggles, gloves, and a lab apron to protect eyes and clothing when working with any chemicals. Keep your hands away from your face or mouth.

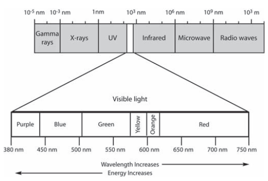
Liquid materials may be flushed down the drain with copious amounts of water. Solid materials may be disposed of in the trash.

Background

Recall that all matter is made of tiny particles called **atoms**. An atom contains both positively-charged **protons** and uncharged **neutrons** within a central area called the **nucleus**. **Electrons** circle about the atomic nucleus. Since electrons are negatively charged, they are attracted to the positive nucleus.

Radiation occurs when an atom loses particles and energy from its nucleus. Radiation occurs both naturally and as a result of human activities. Some natural sources of radiation include radioactive elements such as uranium and radon, which are present within Earth's crust, and radiation reaching Earth from outer space. Human-made sources of radiation include nuclear energy production plants and medical imaging techniques such as x-rays that are used to diagnose illnesses.

The greater the energy of the released radiation, the greater is the potential to do harm to living organisms. The electromagnetic spectrum illustrates some of these high energy types of radiation, including x-rays and gamma rays.



The standard unit of measure for quantifying radiation levels is called a gray (gy). For humans, an average amount of radiation exposure from all sources for an entire year is approximately 0.0036 gy. A dose of radiation exposure in the range of 0.1 to 0.5 gy puts a human at a significantly higher risk for developing cancer. For humans, exposure to 1 gy can cause severe radiation sickness, which may result in death.

Student Guide

ACTIVITY 1

Observing Radiation Effects on Plants

WARNING — This set contains chemicals that may be harmful if misused. Read cautions on individual containers carefully. Not to be used by children except under adult supervision.

Objective

In this activity, you will examine the growth and development of seedlings from seeds that have been exposed to varying levels of radiation.

What you need

Per Group

1 Cup, medicine with 5 seeds, irradiated, 50 gy
1 Cup, medicine with 5 seeds, irradiated, 150 gy
1 Cup, medicine with 5 seeds, irradiated, 500 gy
1 Cup, medicine with 5 seeds, non-irradiated, control
4 Labels, for planting pots
1 Magnifying glass
1 Pencil, wax
1 Pipet, plastic, 1 mL
4 Pots, for planting
1 Ruler, 12-inch
1 Tray, watering

Per Class

1 Fertilizer solution
1 Light, plant grow
2 Soil, potting, bags
Water

Per Student

1 Apron
1 pr. Gloves
1 pr. Safety goggles

What to do

STEP 1
Read the *Background* information in the *Student Guide*.

Day 1: Planting the seeds

STEP 2
Use a magnifying glass to make general observations about the physical characteristics of each of the seed samples. Record your observations in Data Table #1 in the *Recording Observations* section.

STEP 3
Fill each of your four planting pots with potting soil so that the soil is approximately 1 cm below the rim of each pot. Push the potting soil into each pot to eliminate any air pockets.

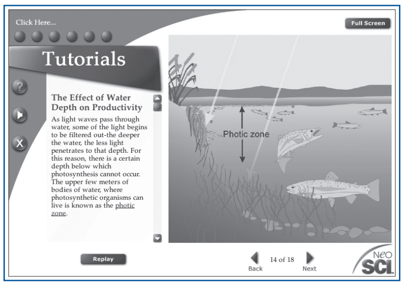
STEP 4
Place each pot in the shallow watering tray. Pour water into each of the pots, so that the soil is moist. Do not pour too much water into each pot; the soil should not have standing (pooling) water.

STEP 5
Spread out the 50 gy-irradiated seeds evenly across the surface of the potting soil in one of the pots. Do not allow the seeds to clump together. Gently press each of the seeds into the potting soil, no deeper than 1 to 2 cm.

STEP 6
Use a wax pencil to label a pot label with the name of the seed sample planted (irradiated seeds, 50 gy) along with the date and your group name or number. Place the pot label into the potting soil at the edge of the pot.

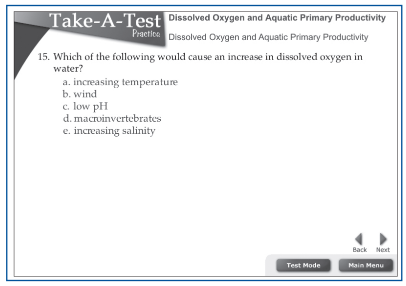
STEP 7
Repeat steps 5 and 6 for each of the three remaining seed samples.

A Closer Look at the Curriculum Resource CD-ROM*…



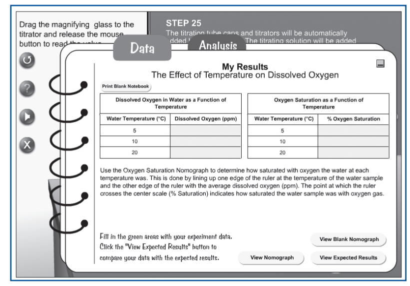
Content Tutorials

- Comprehensive tutorials offering self-paced, individualized lessons through illustrations and animations
- Hyper-linked glossary of key concepts and terms



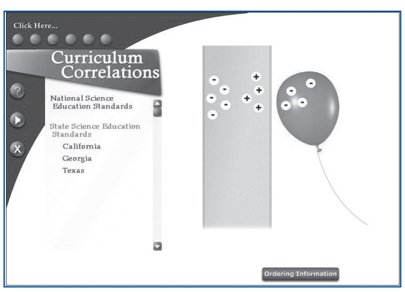
Assessment Monitoring

- Access test questions in either Practice or Test Mode to provide students with exam experience
- Create customized tests and worksheets with various question types, as well as dynamic multimedia tutorials and presentations—saving them on a disk or in web-ready format for easy Internet access



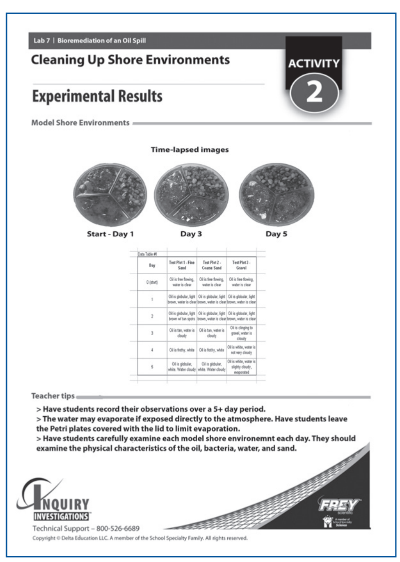
Virtual Laboratory

- Explore the object-based virtual lab environment. The virtual lab allows students to interactively perform every step of a lab activity by manipulating lab equipment on their virtual lab workbench.
- The electronic notebook allows students to record and analyze data.



Correlations to National and selected State Standards

- Key concepts correlated to the National Science Education Standards and 25 selected State standards linked to the Frey Scientific website (**www.freyscientific.com/ inquiryinvestigations**)



Experimental Results

- Useful teacher tips for each activity, as well as in-depth experimental data analysis
- Graphs, tables, and images are provided to enhance each activity.

*CD-ROM System Requirements: Windows 2000 or higher, VISTA-compatible, Mac 9.2 or higher (including OSX), 128 MB RAM