Program Features

Frey's Inquiry Investigations™ Module *Biotechnology Applications* 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.

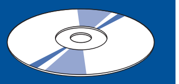
These standards-based units link to core science concepts, making them an excellent complement to your existing curriculum. Best of all, you won't need a strong background in science to use this program—the comprehensive Curriculum Guide that comes with the module provides teacher-friendly instructions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



Also included with the Inquiry Investigations™ Module *Biotechnology Applications* is the Curriculum Resource CD-ROM*, which includes…

Content Tutorials:

- Topic-related content featuring detailed illustrations that cover key biotechnology concepts.
- 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 a biotechnology topic area.
- Dynamic animations that reinforce key biotechnology concepts.
- 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—Preparation and Analysis of a Human Karyotype

- 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 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

Pre-lab Preparation

- Overview of any necessary pre-lab preparation

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

Teacher Guide

Science Concepts and Skills

- Transgenic species
- DNA and RNA
- Making observations
- Herbicides
- Analytical thinking

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 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

- C2 Reproduction and heredity
- C3 Regulation and behavior

Standard E – Science and Technology

- E3 Implement a proposed design
- E6 Understandings about science and technology

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 any chemicals. Remind students to keep their hands away from their face or mouth. Have students use caution when working with the herbicide, they should not allow it to come into contact with their skin, eyes, 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

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Teacher Guide

Lab Materials List

20	Cups, medicine
1	Herbicide, Roundup®, 30 mL
20	Labels, plant
1	Pencil, wax
20	Pots, plant
40	Seeds, genetically modified soybean (GMS), Roundup Ready®
40	Seeds, traditional soybeans (TS)
200	Seeds, weed (mustard)
2	Soil, potting, bags
20	Trays, watering

Teacher-Provided Items

	Aprons (per student)
	Gloves (per student)
1	Grow light (optional)
1	Paper towels, roll
	Safety goggles (per student)
	Water

Note: *Roundup Ready® seeds are to be used for educational purposes only. Roundup® and Roundup Ready® are trademarks of Monsanto Corporation.*

Time Requirements

Activity 1: Demonstrating Herbicide Tolerance in Genetically Modified Soybeans

Pre-lab Preparation:	30 minutes	
Activity:	Day 1:	20 minutes
	Day 5:	10 minutes
	Days 2–13:	5 minutes (every one to two days)
	Day 14:	20 minutes
	Day 15:	5 minutes
	Day 16:	30 minutes

Pre-lab Preparation

Activity 1

Approximately two hours before beginning the activity, soak the traditional soybean seeds (TS) and the genetically modified soybean seeds (GMS) in water. Set each type of seed on two different pieces of paper toweling. Lay another piece of toweling over each group of seeds and pour just enough water onto the paper toweling so that both layers are saturated. Let the seeds soak for two hours. This will allow the seeds time to absorb enough water to break through the seed coats—hastening germination. Place 4 traditional soybeans into each of 10 medicine cups and 4 genetically modified soybeans into each of 10 medicine cups. Distribute one of each seed type to each student group.

For Day 5, you will need to distribute weed (mustard seeds). Reuse the medicine cups. Place 10 seeds into each of the 20 cups, and distribute 2 cups to each group.

Unit 1 | Lab 1: Genetically Modified Crops 19

A Closer Look at the Teacher Guide…

Objective

- Specific student goals of the activity

What you need

- Specific materials used in each activity

Safety and Disposal

- Important safety information specifically related to each activity

What to do

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

Cross-Curricular Integration

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

Recording Observations

- Sample student data for each activity

Questions

- Questions to assess student understanding of the activity

Extensions and Challenges

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

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Teacher Guide

ACTIVITY 1

Demonstrating Herbicide Tolerance in Genetically Modified Soybeans

Objective

In this activity, students will grow two types of soybean seeds (traditional and genetically modified). They will observe and record changes in plant size and growth patterns of these two types of seeds before and after herbicide application.

What you need

Per Group

2	Labels, plant
2	Pots, plant
4	Seeds, genetically modified soybean (GMS), Roundup Ready®
4	Seeds, traditional soybeans (TS)
20	Seeds, weed (mustard)
2	Trays, watering

Per Class

1	Grow light (optional)
1	Herbicide, Roundup®, 30 mL
1	Pencil, wax
2	Soil, potting, bags
	Water

Per Student

	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 any chemicals. Remind students to keep their hands away from their face or mouth. Have students use caution when working with the herbicide, they should not allow it to come into contact with their skin, eyes, 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

Day 1: Planting the Soybean Seeds

STEP 1

Have each group pour potting soil into their pots until the soil is approximately 1 cm below the rim of each pot. Have students gently push the potting soil down into each pot to eliminate any air pockets.

STEP 2

Have students evenly spread the genetically modified soybean seeds across the surface of the potting soil in one of the pots. They should not allow the seeds to clump together in the center of the pot. Have students gently press each of the seeds into the potting soil—no deeper than 1 cm.

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Teacher Guide

Extensions and Challenges

Have students research what a weed is and why some flowering plants are called weeds while others are called *ornamentals*. Ask students to discuss how a soybean farmer and rose gardener might view weeds.

Have students investigate the term *transgenic*. Why was one soybean strain considered transgenic? Have students research the organism from which the transferred gene came.

Pesticides and fertilizers are commonly used to increase crop yield. Have students investigate how these chemicals impact the environment (specifically lakes). How can genetic engineering be used to help eliminate the use for some of these harmful chemicals?

Cross-Curricular Integration

Environmental Science

Have students research why there is such a debate over "escaped" genes from genetically modified agricultural plants. Soybeans have no wild relatives that are native to North America, so is this risk very likely with soybeans?

Agriculture

How big is the increase in soybean production from the use of genetically modified seeds? Have students collect data about the yields of soybeans (number of seeds per acre, sometimes expressed as pounds per acre) using the traditional seeds versus the genetically modified seeds.

Economics

Have students investigate the uses of soybeans. Have students discuss the increasing demand for food as our world population continues to grow. Have them discuss whether using genetically modified crops will help us better feed the world's population.

Mathematics

Have students calculate the percent germination by dividing the number of germinating seedlings by the number of seeds added, and then multiply this number by 100. For commercial seeds, farmers expect a germination rate of at least 80 %. Have students investigate the germination rate of various seed types and seeds stored for various time periods.

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Unit 1 | Lab 1: Genetically Modified Crops 25

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

Note: *Actual data may vary.*

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 has fine droplets?**
   The bacteria have started to break down the oil causing it to form clumps.
3. **How can scientists evaluate 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 observe to 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.

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)

Unit 1 | Lab 3: Bioremediation 47

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

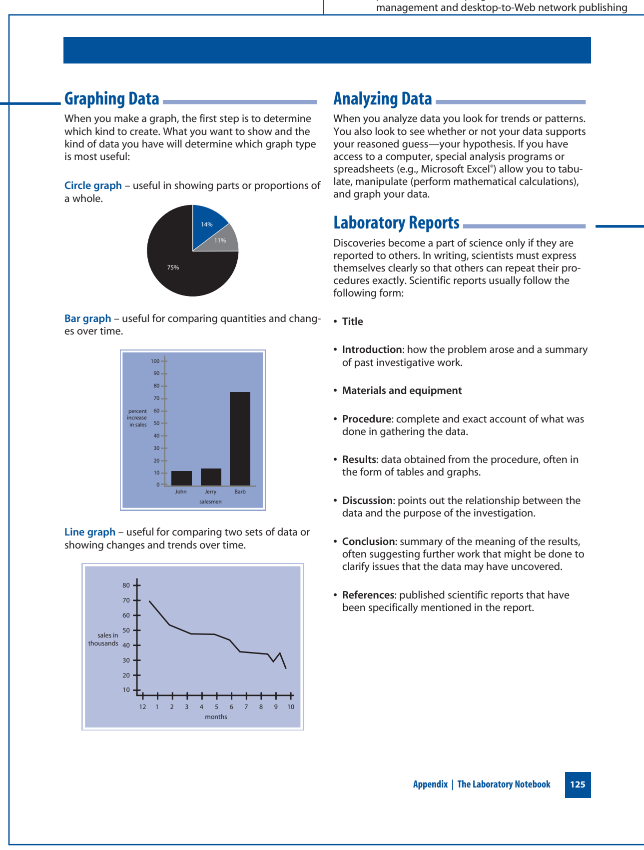
The best method of record-keeping is to record observations in a laboratory notebook or data book. Ideally, this should be a stiff-covered book, permanently bound, not loose-leaf, preferably with square grid pages.

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 tles as subheadings.

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

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 125

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 and Symbols

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 dalton (Da)	=	1 g/mol
1 base pair (bp)	=	660 daltons
1 helical turn	=	10.4 base pairs

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

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

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

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

Table 1: Common Symbols

Quantity	Common Symbol	SI Unit
Temperature	T	˚C
Base pairs	bp	
Lambda	λ	
Dalton	Da	g/mol
Molarity	M	mol/L

Table 2: Common Equations

Quantity	Formula	SI Unit
Slope	$= (\Delta y)/(\Delta x)$	N/A
Equation of a line	$y = mx + b$	N/A
Concentration	$C_1V_1 = C_2V_2$	N/A

C_1 = the concentration of the stock solution (starting solution)
V_1 = the volume to use of the stock solution in the diluted solution
C_2 = the desired concentration of the diluted sample
V_2 = the desired volume of the diluted sample

Glossary

- Comprehensive glossary of key terms

Glossary

A

Adenine (A) One of the four nitrogen bases found in DNA or RNA; can pair only with thymine in DNA and only with uracil in RNA.

Adenovirus Any of a group of viruses that cause upper respiratory infections or infectious pinkeye in humans.

Albinism A genetic disorder that causes defective pigmentation in the individual. An albino usually has translucent skin, white or colorless hair and pink eyes with deep-red pupils.

Allele One of at least two different varieties of a gene for a particular trait.

Alzheimer's disease (AD) The most common form of dementia. A neurologic disease characterized by loss of mental (cognitive) ability severe enough to interfere with normal activities of daily living. AD usually occurs in old age and is marked by a decline in cognitive functions such as remembering, reasoning, and planning.

Amniocentesis A surgical procedure where a thin, hollow needle is inserted into the uterus to obtain amniotic fluid. It is performed to determine if chromosomal abnormalities are present.

Anemia Blood lacking or deficient in red blood cells or hemoglobin; results in decreased ability to transport oxygen throughout the body.

Anode The electrode in an electrochemical cell at which oxidation occurs. The positive (+) electrode.

Antibody Any of a large number of proteins that are produced by specialized white blood cells after stimulation by an antigen (foreign protein) and act specifically against the antigen in an immune response.

Antiparallel Nucleotides are oriented in the opposite direction to one another on the strands of the DNA double helix.

Autoradiogram The image on an x-ray film that results from exposure to radioactive material, such as a radioactive probe.

Autosomal dominant A form of a gene on a non-sex chromosome with an allele that, if present, always expresses the trait for which it codes.

Autosomal recessive The form of a gene on a non-sex chromosome that is not expressed, or is masked, if a copy of the dominant allele is also present in a diploid cell; the recessive allele can be expressed only if two copies of it are inherited from the parents.

Autosome A chromosome that is not a sex chromosome; contains genes that code for traits other than the sex of the individual.

B

Base pair (bp) Two nitrogen bases that are connected by a hydrogen bond.

Bioacculumulation The normal uptake and accumulation in body tissues of an environmental contaminant (chemical or elemental compound) by an organism.

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

Bioremediation A process that uses microorganisms, plants, and animals to return the natural environment, altered by contaminants, to its original condition.

Biotechnology The practical application of knowledge from the study of living things.

BRAC gene Tumor suppressor genes that in mutated form tend to be associated with an increased risk of certain cancers, especially breast and ovarian cancers.

Appendix | Glossary 145

A Closer Look at the Student Guide…

Background

- Science information related to the lab topic

Objectives

- Key concepts and student goals for the lab

What to do

- Step-by-step procedures for each activity

Student Guide

INQUIRY INVESTIGATIONS LAB

Name

Teacher

Date

Unit 1 | Lab 1

Genetically Modified Crops

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

- Understand the connection between DNA and an organism's characteristics
- Understand the processes used to produce transgenic crops
- Compare the traits between genetically modified and traditional soybeans
- Record changes in plant size and growth pattern before and after herbicide application

Safety and Disposal

Follow proper lab safety techniques as directed by your teacher. Always wear safety goggles, gloves, and a lab apron to protect your eyes and clothing when working with any chemicals. Keep your hands away from your face or mouth. Use caution when working with the herbicide. Do not allow it to come into contact with your skin, eyes, or mouth.

Background

The nucleic acids, DNA and RNA, are the "keepers" of all the information that is passed from cell to cell, and from parent to offspring. DNA is found within the nucleus of a eukaryotic cell (a cell having a nucleus). DNA contains all of the information necessary for an organism to live and grow. RNA takes the information from DNA and translates it into something the cell can use, such as a protein. All eukaryotic organisms have DNA and RNA. However, the building blocks of DNA, called nucleotides, can be arranged in many different ways. This means that even closely related organisms can differ in the way their nucleotides are arranged. Nucleotides link up to form sections of DNA, called **genes**. A gene contains the instructions for a trait. RNA reads the information in the gene and as a result, a particular trait of the individual organism is expressed.

Soybeans are a tremendously important agriculture crop in the United States. They are a good source of oils and protein. The United States leads the world in soybean production. Unfortunately, sometimes the amount of soybeans produced (the yield) does not reach the maximum potential. The shortage can result from destruction of crops by unpredictable weather conditions or insect pests. More often, crop yields are reduced due to competition of the crop plant with weedy plants growing in the same fields. This type of limitation on crop yield can be significant, causing an extreme decline in productivity or even crop failure in fields that are heavily infested with weeds.

: Genetically Modified Crops 155

Student Guide

ACTIVITY 1

Demonstrating Herbicide Tolerance in Genetically Modified Soybeans

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 grow two types of soybean seeds (traditional and genetically modified). You will also observe and record changes in plant size and growth patterns of these two types of seeds before and after herbicide application.

What you need

Per Group

2	Labels, plant
2	Pots, plant
4	Seeds, genetically modified soybean (GMS), Roundup Ready®
4	Seeds, traditional soybeans (TS)
20	Seeds, weed (mustard)
2	Trays, watering

Per Class

1	Grow light (optional)
1	Herbicide, Roundup®, 30 mL
1	Pencil, wax
2	Soil, potting, bags
	Water

Per Student

	Apron
1 pr.	Gloves
1 pr.	Safety goggles

What to do

Day 1: Planting the Soybean Seeds

STEP 1
Pour potting soil into your pots until the soil is approximately 1 cm below the rim of each pot. Gently push the potting soil down into each pot to eliminate any air pockets.

STEP 2
Evenly spread the genetically modified soybean seeds across the surface of the potting soil in one of the pots. Do not allow the seeds to clump together in the center of the pot. Gently press each of the seeds into the potting soil—no deeper than 1 cm.

STEP 3
Use a wax pencil to write on one side of a pot label the date and "GMS"—for genetically modified soybeans. Also write your group number or name on the pot label. Place the pot label into the potting soil at the edge of the pot.

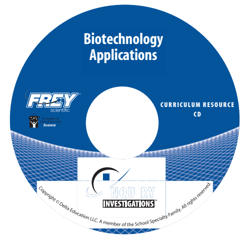
STEP 4
Place the pot in a shallow watering tray. Pour water into the watering tray until the tray is half filled.

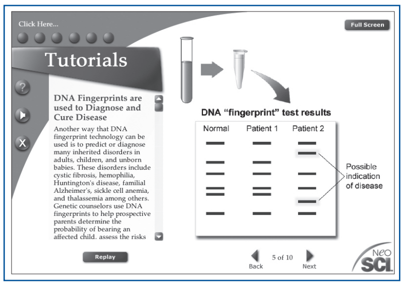
STEP 5
Evenly spread your traditional soybean seeds across the surface of the potting soil in the other pot. Do not allow the seeds to clump together in the center of the pot. Gently press each of the seeds into the potting soil—no deeper than 1 cm.

STEP 6
Use a wax pencil to write on one side of a pot label the date and "TS"—for traditional soybeans. Also write your group number or name on the pot label. Place the pot label into the potting soil at the edge of the pot.

Unit 1 | Lab 1: Genetically Modified Crops 157

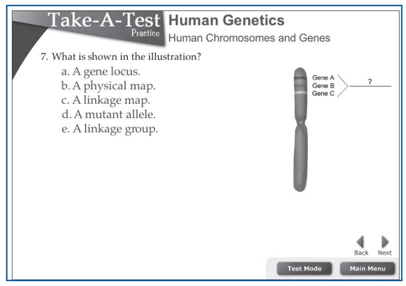
A Closer Look at the Curriculum Resource CD-ROM*…





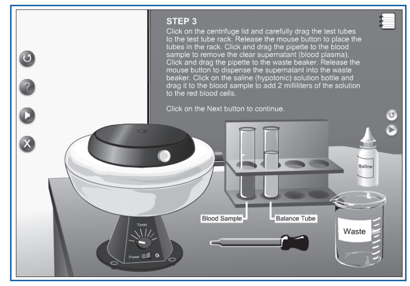
Content Tutorials

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



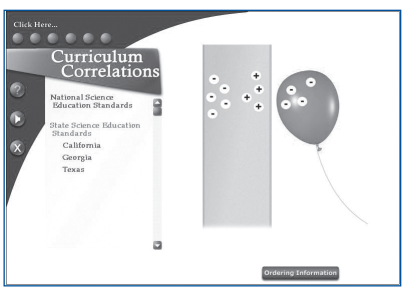
Assessment Monitoring

- 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



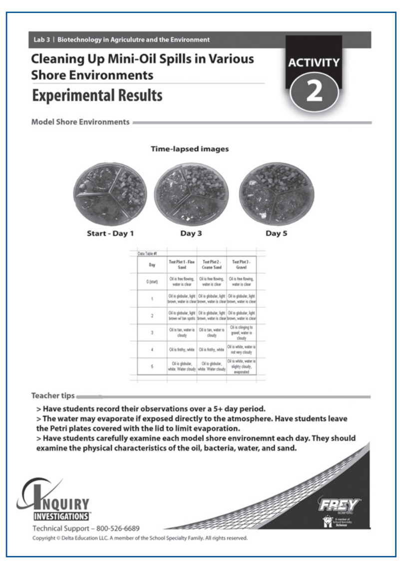
Virtual Laboratory

- 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